

IN THE UNITED STATES BANKRUPTCY COURT
FOR THE WESTERN DISTRICT OF NORTH CAROLINA
CHARLOTTE DIVISION

In re:

KAISER GYPSUM COMPANY, INC., et al.,¹

Debtors.

Case No. 16-31602 (JCW)

Chapter 11

(Jointly Administered)

**DECLARATION OF C. MARIE ECKERT IN SUPPORT OF DEBTORS' RESPONSE
TO GLACIER NORTHWEST INC.'S MOTION *IN LIMINE* TO EXCLUDE DEBTOR'S
EXPERT WITNESS AND ALTERNATIVE CONDITIONAL MOTION *IN LIMINE* TO
EXCLUDE PORTIONS OF GLACIER NORTHWEST INC.'S EXPERT WITNESS**

I, C. Marie Eckert, declare as follows:

1. I am an attorney with the law firm of Miller Nash Graham & Dunn LLP, one of the counsel of record for the Debtors in this action. I have personal knowledge of the following facts, and I am competent to testify.

2. On June 11, 2020, I took the deposition of Philip Spadaro.

3. Attached as Exhibit 1 to this declaration are excerpts from the transcript and exhibits of Mr. Spadaro's deposition.

4. Attached as Exhibit 2 to this declaration is copy of Mr. Bixby's Expert Report on Behalf of Hanson Permanente Cement, Inc., dated May 20, 2020, exclusive of figures and exhibits.

5. Attached as Exhibit 3 to this declaration is a copy of the Expert Report by TIG Environmental dated May 2020, which was Exhibit 5 to Mr. Spadaro's deposition, exclusive of references, tables, figures, and Appendix A.

¹ The Debtors are the following entities (the last four digits of their respective taxpayer identification numbers follow in parentheses): Kaiser Gypsum Company, Inc. (0188) and Hanson Permanente Cement, Inc. (7313). The Debtors' address is 300 E. John Carpenter Freeway, Irving, Texas 75062.

6. Attached as Exhibit 4 to this declaration is a copy of Mr. Bixby's Rebuttal Expert Report dated June 3, 2020, exclusive of figures, tables, and other exhibits.

I certify under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Dated this 22nd day of June, 2020

By: /s/ C. Marie Eckert

C. Marie Eckert

CERTIFICATE OF SERVICE

This is to certify that a copy of the foregoing Declaration of C. Marie Eckert in Support of Debtors' Response to Glacier Northwest Inc.'s Motion *In Limine* to Exclude Debtor's Expert Witness and Alternative Conditional Motion *In Limine* to Exclude Portions of Glacier Northwest Inc.'s Expert Witness has been served upon the following counsel of record by e-mail, addressed to the following as shown below:

Amit Ranade
Hillis Clark Martin & Peterson P.S.
1001 4th Avenue
Seattle, Washington 98154
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Email: Amit.Ranade@hcmp.com

Dated this 22nd day of June, 2020.

/s/ C. Marie Eckert

C. Marie Eckert, P.C.
Miller Nash Graham & Dunn LLP
3400 U.S. Bancorp Tower
111 S.W. Fifth Avenue
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Case No. 16-31602 (JCW)

Deposition of Phillip Spadaro

Kaiser Gypsum Company, Inc., et al.

June 11, 2020



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UNITED STATES BANKRUPTCY COURT
WESTERN DISTRICT OF NORTH CAROLINA
CHARLOTTE DIVISION

In Re:) Chapter 11
)
KAISER GYPSUM COMPANY, INC.,) CASE NO.
et al.,) 16-31602 (JCW)
)
 debtors.)

VIDEOCONFERENCE DEPOSITION UPON ORAL EXAMINATION
OF
PHILLIP SPADARO

Taken in Seattle, Washington
(ALL PARTICIPANTS APPEARING VIA VIDEOCONFERENCE)

DATE TAKEN: June 11, 2020

REPORTED BY: Nancy M. Kottenstette, RPR, CCR 3377

1 APPEARANCES

2 FOR GLACIER NORTHWEST:

3 Amit D. Ranade, Esq.
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11 FOR HANSON PERMANENTE CEMENT:

12 C. Marie Eckert, Esq.
MILLER NASH GRAHAM & DUNN
13 3400 U.S. Bancorp Tower
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14 Portland, OR 97204
503.205.2477
15 marie.eckert@millernash.com

16 ALSO PRESENT:

17 Deborah Murphey, Glacier in-house counsel
Pete Stoltz, Glacier government affairs manager
18 Charles McChesney, Hanson in-house counsel
Sabine Datum, TIG Environmental
19 Ryan Bixby, Sound Earth Strategies
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INDEX OF EXAMINATION

PAGE

EXAMINATION

Questions By Ms. Eckert: 4

INDEX OF EXHIBITS

NUM.	DESCRIPTION	PAGE
------	-------------	------

Exhibit 5	Expert Report by TIG Environmental dated May 2020	4
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Exhibit 6	Rebuttal to Bixby Expert Report by TIG Environmental dated June 2020	4
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1 deviate from any of those figures in the RI,
2 Exhibit 3?

3 A No. We didn't intentionally deviate from
4 them. We had to make our own surface area
5 measurements because the exact surface areas weren't
6 provided. So we gave those figures to our GIS
7 department and had them digitize the operational
8 areas, and we used the numbers resulting from that
9 process.

10 Q I will come back to that in a little bit.

11 And then the final one is the exacerbation
12 factor, which we will talk more about. Would you
13 agree that determining an exacerbation factor is a
14 subjective determination?

15 A Not entirely, no. There's perhaps a little
16 bit more subjectivity than some of these other easily
17 obtained metrics, but I would not say that it's
18 entirely subjective, no.

19 Q Would you agree that it has a subjective
20 component that would be different from, say, metric
21 one, the origin of contaminants of concern; correct?

22 A Yes. I would agree to that, yes.

23 Q With respect to the algorithm that you used,
24 there were -- the steps are outlined in your report,
25 and at the end of Step 5, the results of the algorithm

1 talked about, and that is with Reichhold and Carlisle
2 and the prior construction activities.

3 Now, why did you not -- did TIG not assign any
4 exacerbation factor related to either of those prior
5 two construction activities, for lack of a better
6 word?

7 A Yeah. The answer is fundamentally the same as
8 what I said a little bit earlier, that we saw those.
9 We understand that, certainly, there would have had to
10 have been some activities, but we deemed them very
11 small as to be de minimis.

12 Q Okay. You think plant construction and
13 drainage ditches and all those things combined can be
14 de minimis?

15 A Yes.

16 Q Okay. And, well, going back to Hanson, so the
17 amount of soil that was removed or redistributed, if
18 any, by Hanson, is unknown; correct?

19 A There's no precise measurement of it, and if
20 you mean unknown in that respect, yes. There is
21 considerable documentation and the ability to infer
22 that it was very large, and the air photo evidence
23 suggests there's quite a bit of soil movement during
24 construction of the facility. And the facility
25 itself, being the type it is, suggests that much

1 deeper foundations, much more substantial soil
2 excavations would have to have been performed.

3 Q I understand. And just to be clear on my
4 prior question, I'm reading from your report at
5 page 11. It says: However, bottom of the page 11,
6 excuse me, the total amount of soil removed and/or
7 redistributed during the removal of the facilities,
8 including building foundations, is unknown. And then
9 you have a citation there to ERM. So I assume that
10 came from the RI report we discussed?

11 A Correct.

12 Q Shifting gears a little bit, Glacier bought
13 the property in 1991. Did Glacier conduct any
14 environmental investigations prior to purchasing the
15 property?

16 A I'm not aware of any, no.

17 Q And would it have been a common or uncommon
18 practice in 1991 to conduct an environmental
19 investigation prior to leasing or purchasing property?

20 A You know, that was a very transitional time,
21 and I say the industry and the industrial real estate
22 industry was in flux. There was no consensus,
23 certainly no requirement, for such things as there is
24 now. So I think it would have been something quite
25 optional.

1 In Step 6 of the algorithm, you assigned an
2 exacerbation factor to 15 percent, which took Hanson
3 from 1.26 percent to 14.88 percent. And if you would
4 like to look -- find that reference, I've got page 24
5 of your expert report talks about that reassignment to
6 Hanson of 15 percent of the liability of prior owners.

7 So I'll let you get there if you need to. And
8 then my question is: Is that correct, that Step 6
9 resulted in the application of an exacerbation factor
10 that increased Hanson's share to just below
11 15 percent?

12 A Yeah. That's a correct representation of our
13 report.

14 Q And I asked you earlier about whether that was
15 a subjective determination, and I think you recognized
16 that there was some subjective component. I mean,
17 there is no data to support that -- the magnitude of
18 that factor, no specific facts; correct?

19 A I wouldn't -- I wouldn't agree with you on
20 that point, no. I would say that it's less
21 quantitative than the other metrics that we were able
22 to apply. But it's not arbitrary, and it's not
23 entirely subjective.

24 We looked at all of the evidence of the aerial
25 photos, of what was detected where at the site, and

1 what elevation, what lateral extent, and, you know,
2 our first approach was just to make kind of a coarse
3 aerial extent change measurement. And we came up with
4 a quite high number, something on the order of
5 45 percent change due to those redevelopment
6 activities.

7 We thought that 45 percent was really far too
8 high an exacerbation factor to apply under these
9 circumstances, but it was based on our careful
10 consideration of the evidence and, therefore, not just
11 arbitrary or random. We further looked at changes
12 that were made in volume, and by volume I mean we made
13 some back calculations of what volumes of soil might
14 have been moved due to different activities. And we
15 arrived at something around 26 percent of soil volume
16 might have been moved. Again, we thought that was too
17 high.

18 So I will acknowledge that there is
19 subjectivity to it, but the subjectivity that we
20 applied was after very careful thought, very diligent
21 inspection of the evidence and of what might have been
22 considered just in sort of a coarse way of looking at
23 it. In finding those factors to be too high, we
24 applied 15 percent in judgment that was reasonable.
25 It was a reasonable place to arrive for an

1 exacerbation factor in this case.

2 Q Your judgment, again, was based on an
3 assumption that Hanson knowingly moved contaminated
4 material. If you were to assume that Hanson did not
5 know that it was moving contaminated material or
6 increasing contaminations, what would the impact be on
7 the exacerbation factor?

8 A I don't have an answer for you. That -- I
9 appreciate your question very much, but it requires
10 careful thought, not speculation. So I don't know.

11 And Amit is preparing to say something so I'll
12 shut up.

13 MR. RANADE: The timing and the format
14 is sometimes unfortunate.

15 THE WITNESS: I try to keep my eye on
16 you for objections. I apologize. I have to look at
17 so many different things. It's quite hard.

18 MR. RANADE: The Brady Bunch screen;
19 right?

20 I wanted to -- I have an objection to that
21 question. I think it's misstating the prior
22 testimony. I don't recall Mr. Spadaro saying that
23 knowledge was a relevant factor here, but given the
24 passage of time, you may want to restate your question
25 so he can answer it. He can certainly answer it.

1 share to Hanson up to 14.88 percent. And then we come
2 to Step 7 of the algorithm. In Step 7 of the
3 algorithm, TIG reallocates liability only to Glacier,
4 Hanson, and Reichhold.

5 Were you told to assume that the costs should
6 only be allocated between these three parties?

7 A This is part of my understanding of the
8 problem statement for our work. I wasn't told to do
9 this, but, you know, from the very beginning and
10 understanding the case we're dealing with, it made
11 sense to me that ultimately our work, TIG's work, my
12 opinion would have to provide useful answers in the
13 context of this case where there are only those three
14 parties -- I realize, of course, Reichhold isn't
15 present, but the three parties in the mix, so to
16 speak. So from the very beginning, it was my
17 intention to come to this step.

18 Q Well, did you consider that all of the costs
19 did not need to be allocated in this proceeding
20 because all the parties are not present?

21 A Well, I acknowledged that that is a potential
22 outcome, but, no, I didn't include that in our
23 thoughts. Perhaps just in my effort to really account
24 for all the monies at play, I assumed from the get-go
25 that we're dealing with the cost of investigation here

1 that piece of the liability to the parties that I feel
2 are here. So, you know, I didn't -- I don't feel like
3 I did anything unfair with that.

4 Q So when I asked if you had done a similar sort
5 of allocation, you said yes. I should have made the
6 question clearer. I understand that happens,
7 obviously, when you get orphan shares.

8 Have you ever done a reallocation like
9 happened here in Step 7 of the algorithm when you knew
10 that there were other viable parties that are out
11 there and available to be sued?

12 A You know, sometimes -- I can think of a couple
13 cases where we have done that as a way of reaching a
14 consensus where one or more parties was just deemed to
15 be not relevant to the discussion. I'm thinking of
16 some of the work I've done in other places, yeah,
17 where there were parties that could have been pursued
18 had -- it's not up to me, of course, whether to decide
19 to pursue someone or not pursue someone for cost
20 recovery.

21 But there are instances that I can think of
22 where there could have been others to pursue and
23 parties simply chose not to do so and to absorb those
24 shares in a consensus fashion. I don't think it's
25 unique, and perhaps I don't think it's highly unusual

1 to take this approach.

2 Q You just referred to reallocating shares in a
3 consensus fashion. That would not be applicable in
4 this case; right?

5 A Being an adversarial procedure, no, I guess
6 not.

7 Q And you -- well, we've established that you
8 haven't been involved in a proof of claim proceeding,
9 so let me ask a related but slightly different
10 question.

11 As a result of this reallocation in Step 7 of
12 the algorithm, you've got Glacier has 3.52 percent,
13 Reichhold has 58.94 percent, and Hanson at
14 37.54 percent. Now, the dollar amount attributable to
15 Hanson as a result is \$3,230,597 and some change. I'm
16 taking this out of your report. Are you aware that
17 that is more than Glacier has paid for environmental
18 cleanup costs?

19 A No. I didn't do that math that you're
20 describing right there to measure that up against what
21 parties have paid, no. You know, I suppose I'll take
22 your word for it. You've obviously done that math.

23 Q Well, I'll tell you that I will represent to
24 you that Glacier has represented to Hanson in the
25 course of this proceeding that they incurred a little

1 over \$3 million in costs, 3,008,000 and some change.

2 So this recovery would be more than Glacier has paid.

3 Have you ever done an allocation where the
4 result was that your client gets back more than
5 they've paid in cleanup costs?

6 MR. RANADE: I'm going to object to
7 that question. I think it's assuming some facts that
8 maybe haven't been established. I think it's implying
9 statements that are not necessarily true, but go ahead
10 and answer the question.

11 A Yeah. I'm thinking back, you know, scrolling
12 back through memories. I can't think of a case that
13 has an example like that, no, Ms. Eckert.

14 Q If you are able in a proceeding like this to
15 recover all or more than Glacier has paid, in your
16 view could Glacier then go after other parties and
17 have similar recoveries based on allocation just among
18 the parties through a different proceeding?

19 A I think that is more of a legal question as to
20 what parties can do in cost recovery. I may not be
21 the best person to address that.

22 Q Fair enough. You're probably right.

23 Have you ever had a court award your client
24 more than they have paid in costs?

25 A No, I have not.

C E R T I F I C A T E

STATE OF WASHINGTON

COUNTY OF KING

I, Nancy M. Kottenstette, a Certified
Shorthand Reporter in and for the State of Washington,
do hereby certify that the foregoing transcript of the
deposition of Phillip Spadaro, having been duly sworn,
on June 11, 2020, is true and accurate to the best of
my knowledge, skill, and ability.

I do further certify that I am a disinterested
person in this cause of action; that I am not a
relative of the attorneys for any of the parties.

IN WITNESS WHEREOF, I have hereunto set my
hand and seal this 12th day of June, 2020.

Nancy M. Kottenstette

Nancy M. Kottenstette, RPR, CCR 3377





SoundEarth Strategies, Inc.
2811 Fairview Avenue East, Suite 2000
Seattle, Washington 98102

Confidential Mediation Communication

May 20, 2020

Mr. Jeff Miller
Miller Nash Graham & Dunn LLP
500 Broadway Street, Suite 400
Vancouver, Washington 98660

**SUBJECT: EXPERT REPORT ON BEHALF OF HANSON PERMANENTE CEMENT, INC.
Westside Property
5900 West Marginal Way Southwest, Seattle, Washington
Project Number: 1290-001**

Dear Mr. Miller:

I am pleased to provide Hanson Permanente Cement, Inc. (Hanson; formerly known as Kaiser Cement Corporation) with this expert report detailing my findings and opinions regarding the potential liability of Hanson and other parties with respect to the environmental impacts at the Westside Property, located at 5900 West Marginal Way Southwest (the Property).

This report is prepared on behalf of Hanson and addresses Hanson's potential contribution to the impacts present at the Property. My understanding is that Hanson is engaged in a claim objection resolution process that will include mediation with the current owner of the Property, Glacier Northwest, Inc. (Glacier), and that claim objection process that is intended to resolve a dispute over liability for past remedial costs at the Property.

The report focuses on potential contributions of chemicals of potential concern (COPCs) from past activities and operations on the Property. It is intended to assist in the allocation process by summarizing the vast quantity of information regarding the historical activities and operations and by providing my opinion regarding the nature and extent of impacts at the Property and the assignment of liability for those impacts.

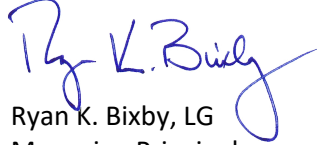
I am a Washington State-licensed geologist and an environmental professional, as defined in the American Society for Testing and Materials International's Standard E1527-13, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process. I have practiced as an environmental consultant in the Puget Sound region since 1998 and have been employed by SoundEarth Strategies, Inc. (SoundEarth) since 2005. I have served as a Principal with SoundEarth since 2009. As indicated on my résumé (Attachment A), I have personally performed more than 500 Phase I Environmental Site Assessments (ESAs) of properties throughout the Puget Sound region, and have performed senior review of more than 1,000 Phase I ESAs that have been prepared by other SoundEarth staff. These Phase I ESAs have included a review of the historical and current operations performed on and proximal to a wide variety of industrial and commercial properties for the purpose of evaluating the potential risk of impacts

from those operations. In addition, I have overseen the investigation of hundreds of properties with known or suspected impacts to soil, groundwater, and soil vapor, as well as the investigation and remediation of sites with known or suspected sediment impacts, including several industrial properties along the Lower Duwamish Waterway.

I have been retained as an expert witness for more than a dozen projects involving cost recovery and cost allocation under the Washington State Model Toxics Control Act and Comprehensive Environmental Response, Compensation, and Liability Act. However, none of these cases have proceeded to trial or required me to be deposed within the last 4 years, and I have not authored any publications in the last 10 years. My standard billing rate, which was used in the preparation of this expert report on behalf of Hanson, is \$300 per hour. My expert witness billing rate during testimony is \$450 per hour.

Respectfully,

SoundEarth Strategies, Inc.



Ryan K. Bixby, LG
Managing Principal

Attachment: A, Résumé

cc: Charles McChesney, Three Rivers Management, Inc.

RKB:dnm



Ryan K. Bixby, LG
Managing Principal

Mr. Bixby has over 22 years of experience completing hundreds of Phase I and Phase II Environmental Site Assessments and directing numerous remediation projects to evaluate the sources and extent of contamination associated with current and historical land uses. He has completed remedial investigations and feasibility studies on dozens of sites, working with regulatory agencies to receive site closure through the Voluntary Cleanup Program and Ecology's formal programs. He has provided litigation support to assign and direct cost recovery efforts under the Washington State Model Toxics Control Act.

PROJECT EXAMPLES

Jorgensen Forge Corporation (JFC), Washington. Served as the Principal-in-charge for the investigation and remediation of the JFC property, a roughly 20-acre property located on the eastern bank of the Lower Duwamish Waterway. Operations at the facility have included metal melting, forging, heat-treating, galvanizing, machining, and distribution. Impacts encountered at the JFC property include those from polychlorinated biphenyls, chlorinated solvents, petroleum hydrocarbons, metals, and polycyclic aromatic hydrocarbons (PAHs). As part of the remediation efforts associated with the Lower Duwamish Waterway, contaminated sediments and associated bank materials along the JFC property have been investigated, dredged, and removed as part of an Early Action Area under an Administrative Settlement Agreement and Order on Consent for Removal Action Implementation issued by the U.S. Environmental Protection Agency. SoundEarth's activities at the JFC property have also included the operation, maintenance, and optimization of a stormwater treatment system that is intended to minimize the concentration of chemicals of concern to the stormwater outfalls that discharge to the Duwamish River.

Perine Property, Seattle, Washington. Principal-in-charge for the investigation, remediation, and cost recovery efforts associated with an industrial property that was adversely impacted by an adjacent, upgradient plating facility. Oversaw Phase I and Phase II Environmental Site Assessments, which demonstrated that chlorinated solvents, including PCE, had migrated beneath the Perine property via groundwater and soil vapor. Assisted the client's counsel in demonstrating that the impacts originated from the adjacent property, and facilitated cost recovery efforts against the adjacent property owner and its insurers. Oversaw the design and installation of a vapor intrusion mitigation system to prevent exposure to workers within the Perine property building. Currently monitoring the effectiveness of a cleanup action plan to address the impacts beneath the Perine property.

Duwamish Marine Center Remediation, Lower Duwamish Waterway, Seattle, Washington. Principal-in-charge for an RI under an Agreed Order with Ecology to assess the nature and extent of contamination in soil, groundwater, air, stormwater, and sediments at a property located adjacent to the Lower Duwamish Waterway.

Seattle Parks and Recreation Bryant Building, Portage Bay, Seattle, Washington. Principal-in-charge for the Phase I and II ESAs, hazardous material survey, and sediment sampling of a property located on Portage Bay. Delineated impacts from petroleum hydrocarbons, PAHs, metals, and volatile organic compounds. Directed sediment sampling and stormwater outfall investigations and assisted Seattle Parks and Recreation with future planning efforts. Provided a remedial cost estimate and remedial plan that aided in future planning efforts and negotiations with project stakeholders, and facilitated discussion on capitol cost budgeting.

Seattle Parks and Recreation Due Diligence Program, City of Seattle, Seattle, Washington. Managed the due diligence program between 2005 and 2008 before taking over the Principal review responsibilities in 2008. Provided reporting and guidance for environmental due diligence associated with potential property acquisitions by the City of Seattle Parks and Recreation Department (SPR). Participated in the development of over 50 Phase I ESAs and additional investigations and hazardous material surveys to aid in the purchase and rehabilitation of SPR properties into open space and other park facilities.

EXPERIENCE AND KNOWLEDGE

- Personally completed over 500 Phase I Environmental Site Assessments (ESAs) on residential, commercial, and heavy industrial properties and performed senior review of more than 1,000 Phase I ESAs completed by other staff.
- Managed 2 large petroleum programs consisting of more than 60 sites and 3 former bulk fuel facilities.
- Oversaw the implementation of petroleum remediation systems of various types at 16 sites.
- Conducted numerous Phase II subsurface soil and groundwater investigations on properties, such as retail gasoline stations, automotive service centers, dry cleaning facilities, abandoned landfills, shipyards, bulk fuel facilities, and other industrial sites.
- Prepared and oversaw Remedial Investigations (RIs), Feasibility Studies (FSs)/Disproportionate Cost Analyses, Cleanup Action Reports, and Closure Reports.
- Identified potentially liable persons and established cost allocation via forensic analyses.

EDUCATION

BA in Geology, Whitman College, Walla Walla, WA, Minor in Anthropology
Graduate School, University of Montana

LICENSES AND CERTIFICATIONS

- Washington State Licensed Professional Geologist #1691
- HAZWOPER—40-hour OSHA

RYAN K. BIXBY, LG
MANAGING PRINCIPAL

Hungry Whale Gasoline Station, Port of Grays Harbor, Grays Harbor, Washington. Oversaw the completion of the RI phase of the Agreed Order for this project and worked with the Port of Grays Harbor toward completion of their remaining obligations. The Hungry Whale is an operational retail gasoline station with confirmed impacts to the subsurface from leaking underground storage tanks (USTs). The Port of Grays Harbor currently owns the property on which the gasoline station operates and entered into an Agreed Order with Ecology to conduct the RI and FS, and to prepare a cleanup action plan.

Washington State Department of Transportation, Washington. Performed Principal review on eight Phase I ESAs of properties located adjacent to the Alaskan Way viaduct in preparation for condemnation and property acquisition associated with the SR 99 bored tunnel. The due diligence efforts were performed in an effort to identify potential releases that may be encountered in the course of the planned excavation effort as well as assignment of liability.

Trammell Crow Residential, Washington. Performed due diligence on several multiparcel properties that have historically been occupied by dry cleaning facilities and/or retail gasoline stations. The due diligence efforts included Phase I ESAs and subsurface investigations, the results of which allowed the client to make informed decisions regarding the value and liabilities associated with the properties.

Goodman Real Estate. Performed principal review of numerous Phase I ESAs for properties that were owned or being considered for purchase by Goodman Real Estate, including commercial, residential, and industrial properties. The client-imposed schedules frequently required that the due diligence efforts be completed in less than 2 weeks in order to allow the transaction to proceed.

KeyBank Due Diligence, KeyBank, Washington. Managed numerous Phase I and II ESAs conducted for KeyBank in conjunction with lending activities. Completed more than a dozen reports for a variety of client and property types.

Due Diligence and Environmental Site Assessments. Completed more than 500 Phase I ESAs on residential, commercial, and heavy industrial properties throughout the Pacific Northwest, California, and Colorado. Conducted numerous Phase II subsurface soil and groundwater investigations, including direct-push technology, sonic rig, hollow-stem auger, and test pit excavation on properties, such as current and former retail gasoline stations and automotive service centers, dry cleaning facilities, abandoned landfills, shipyards, and bulk fuel facilities. Oversaw more than 50 soil and groundwater remediation projects, many of which were involved in Agreed Orders or the Voluntary Cleanup Program and which subsequently resulted in No Further Action (NFA) determinations from the regulatory agency.

Expert Witness and General Litigation Support. Retained as the Expert Witness or Consulting Witness on more than a dozen projects. Cases ranged in complexity from commingled plumes of heating oil beneath residential properties, to widespread impacts of a former dry cleaning property and adjoining rights-of-way. Required an understanding of the spatial and temporal distribution of impacts and the forensic analytical results to assist in the pursuit of cost recovery and cost allocation. Also required the preparation of figures and other exhibits that were intended to be introduced in court on behalf of our client. Individual settlements associated with the cases on which Mr. Bixby has worked have exceeded \$1,000,000.

TOC Holdings Co. Petroleum Program, TOC Holdings Co., Washington and Oregon. Responsible for the program management and oversight of the TOC Holdings Co. retail petroleum program between 2005 and 2018, which included more than 60 facilities. Oversaw the completion of field activities, including groundwater monitoring, operation and maintenance visits, and UST removal and excavation activities; coordinated the preparation of Phase I and Phase II ESAs, RIs, FSs, and corrective action plans/reports; and ensured the proper design and installation of remedial systems. Also responsible for the development of proposals, client management, and communications with local, state, and federal regulatory agencies. In 2008, TOC Holdings Co. adopted an aggressive 7-year plan to obtain closure for all of its facilities. Mr. Bixby worked with Oregon Department of Environmental Quality and Ecology to achieve NFA determinations at more than a dozen of the facilities, and others were prepared for successful property transactions.

North Colfax Petroleum Contamination Site, Colfax, Washington. Principal-in-Charge for the RI and FS that are being performed under an Agreed Order with Ecology. This multiple-potentially-liaible-persons site has been impacted by releases from retail gasoline stations that have operated on three separate properties. The impacts from the site extend beneath adjoining rights-of-way and a railroad spur.

Tesoro Petroleum Program, Tesoro Refining and Marketing Company, Washington and Idaho. Managed the investigation, monitoring, and remediation of numerous current and former retail gasoline stations for the Tesoro Petroleum Program between 2005 and 2019. In addition to retail gasoline stations, the program included a former bulk fuel facility in Mount Vernon, Washington, that was discovered in the course of an RI at the adjacent operational gasoline station.



SoundEarth Strategies, Inc.
2811 Fairview Avenue East, Suite 2000
Seattle, Washington 98102

EXPERT REPORT ON BEHALF OF HANSON PERMANENTE CEMENT, INC.



Property:

Westside Property
5900 West Marginal Way Southwest
Seattle, Washington 98106

Prepared for:

Miller Nash Graham & Dunn LLP
500 Broadway Street, Suite 400
Vancouver, Washington

Report Date:

May 20, 2020

CONFIDENTIAL MEDIATION COMMUNICATION

CONFIDENTIAL UNDER APRIL 19, 2018 AGREED
PROTECTIVE ORDER (DKT. 901)

Expert Report on Behalf of Hanson Permanente Cement, Inc.

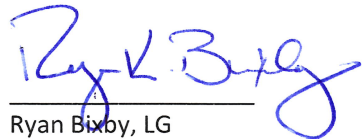
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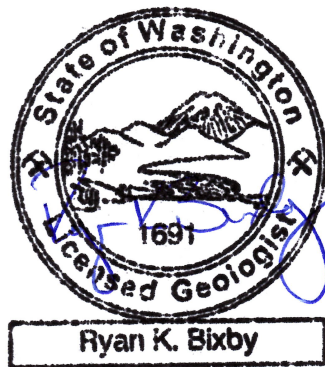
Westside Property
5900 West Marginal Way Southwest
Seattle, Washington 98106

Project No.: 1290-001

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May 20, 2020



TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS.....	vi
1.0 INTRODUCTION	1
2.0 BACKGROUND	1
2.1 OWNERSHIP HISTORY	1
2.2 PRE-HANSON HISTORY OF OPERATIONS AND IMPROVEMENTS	1
2.2.1 Mineralized Cell.....	1
2.2.2 Whetlerite Manufacturing	2
2.2.3 Reichhold Chemical.....	3
2.3 HANSON'S HISTORY OF OPERATIONS AND IMPROVEMENTS	5
2.4 POST-HANSON HISTORY OF OPERATIONS AND IMPROVEMENTS	8
2.5 HISTORY OF ADJOINING PROPERTIES.....	8
2.5.1 Duwamish Shipyards, Inc.	8
2.5.2 Terminal 115	8
2.5.3 Lower Duwamish Waterway	9
3.0 PREVIOUS INVESTIGATIONS AND INTERIM ACTIONS.....	9
4.0 GEOLOGY/HYDROGEOLOGY.....	11
4.1 FILL MATERIAL	11
4.2 GROUNDWATER FLOW	12
4.3 SEDIMENTS	12
5.0 DISTRIBUTION OF IMPACTS	13
5.1 ARSENIC.....	13
5.2 DIOXINS/FURANS	13
5.3 PCP.....	14
5.4 PCBS.....	15
6.0 RELATIVE CONTRIBUTION OF SOURCES.....	15
6.1 EQUITABLE FACTOR 1—WHETHER A PARTY USED OR HANDLED PRODUCTS CONTAINING THE COPCS IN ITS OPERATIONS	16
6.1.1 Mineralized Cell.....	16
6.1.2 Carlisle, Crown Zellerbach, and U.S. Government	16
6.1.3 Reichhold	17
6.1.4 Hanson and Glacier	17
6.2 EQUITABLE FACTOR 2—THE DEGREE OF CARE EXERCISED BY A PARTY TO PREVENT THE RELEASE OR FURTHER SPREAD OF A RELEASE DURING ITS OPERATIONS OR PERIOD OF OWNERSHIP	17
6.2.1 Mineralized Cell.....	17
6.2.2 Carlisle, Crown Zellerbach, and U.S. Government	18

TABLE OF CONTENTS (CONTINUED)

6.2.3	Reichhold	18
6.2.4	Hanson	19
6.2.5	Glacier	20
6.3	EQUITABLE FACTOR 3—THE MAGNITUDE AND DURATION OF THE RELEASES CAUSED BY A PARTY	20
6.3.1	Mineralized Cell.....	20
6.3.2	Carlisle, Crown Zellerbach, and U.S. Government	21
6.3.3	Reichhold	21
6.3.4	Hanson and Glacier	21
6.4	EQUITABLE FACTOR 4—THE EXTENT OF THE PARTY’S KNOWLEDGE AND AWARENESS OF THE PRESENCE OF CONTAMINATION DURING THEIR PERIOD OF OWNERSHIP/OPERATION.....	22
6.5	EQUITABLE FACTOR 5—THE ANTICIPATED RELATIVE COST ASSOCIATED WITH THE INVESTIGATION OF THE SPECIFIC COPCS RELEASED BY THE PARTY	23
6.6	EQUITABLE FACTOR 6—THE DISTINGUISHABILITY OF IMPACTS RELATED TO THE PARTY	24
6.6.1	Metals	24
6.6.2	Dioxins/Furans	24
6.6.3	PCP	24
6.6.4	PCBs.....	24
6.6.5	1967–1968 Shoreline Expansion	25
6.6.6	1970 T115 Expansion	25
7.0	RECOMMENDED ASSIGNMENT OF LIABILITY	26
7.1	MINERALIZED CELL	26
7.2	CARLISLE	27
7.3	CROWN ZELLERBACH.....	27
7.4	U.S. GOVERNMENT.....	28
7.5	REICHHOLD	28
7.6	PORT OF SEATTLE	29
7.7	HANSON	29
7.8	GLACIER	31

TABLE OF CONTENTS (CONTINUED)

FIGURES

- 1 Property Location Map
- 2 Former Mineralized Cell Operational Features
- 3 Former Carlisle, Crown Zellerbach, and U.S. Government Operational Features
- 4 Former Reichhold Operational Features
- 5 Former Hanson Operational Features
- 6 Areas of Arsenic Exceeding Screening Levels
- 7 Areas of Dioxins/Furans Exceeding Screening Levels
- 8 Areas of PCP Exceeding Screening Levels
- 9 Areas of PCBs Exceeding Screening Levels
- 10 Areas of COPCs Exceeding Screening Levels

APPENDICES

- A Historical Documents
- B ERM Documents
- C Laboratory Analytical Rates
- D Expert Report Bibliography

ACRONYMS AND ABBREVIATIONS

Ash Grove	Ash Grove Cement West, Inc.
AST	aboveground storage tank
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
Carlisle	Carlisle Lumber Company
COPC	contaminant of potential concern
Crown Zellerbach	Crown Zellerbach Corporation
CWS	Chemical Warfare Service
D/Fs	dioxins/furans
DRPH	diesel-range petroleum hydrocarbons
DSI	Duwamish Shipyards, Inc.
Ecology	Washington State Department of Ecology
ERM	ERM-West Inc.
ERM RI	DRAFT Remedial Investigation/Feasibility Study Report—Volume 1, dated January 24, 2020, prepared by ERM-West, Inc.
FS	feasibility study
Glacier	Glacier Northwest, Inc.
Hanson	Hanson Permanente Cement, Inc.
Kaiser	Kaiser Cement Corporation
LDW	Lower Duwamish Waterway
LDWG	Lower Duwamish Waterway Group
LSI	Lone Star Industries, Inc.
Mineralized Cell	Mineralized Cell Wood Preserving Company
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl

ACRONYMS AND ABBREVIATIONS (CONTINUED)

PCP	pentachlorophenol
pH	power of hydrogen
Port	the Port of Seattle
the Property	the uplands portion of the Westside Property located at 5900 West Marginal Way Southwest in Seattle, Washington; King County Parcel Number 192404-9029
Reichhold	Reichhold Chemical
RI	remedial investigation
SL	screening level
SoundEarth	SoundEarth Strategies, Inc.
SPU	Seattle Public Utilities
T115	Terminal 115
TEQ	toxicity equivalency quotient
U.S.	United States
USEPA	United States Environmental Protection Agency

Report on Behalf of Hanson Permanente Cement, Inc.

1.0 INTRODUCTION

SoundEarth Strategies, Inc. was commissioned by Hanson Permanente Cement, Inc. (formerly known as Kaiser Cement Corporation [Kaiser]; hereinafter referred to as Hanson) to produce an expert report regarding Hanson's potential liability for the contamination present at the uplands portion of the Westside Property (the Property) located at 5900 West Marginal Way Southwest in Seattle, Washington (King County Parcel Number 192404-9029; Figure 1).

2.0 BACKGROUND

As documented in the DRAFT Remedial Investigation/Feasibility Study Report—Volume 1, dated January 24, 2020, prepared by ERM-West, Inc. (ERM; the ERM RI; GLACIER06561), the Property is situated along the western shore of the Lower Duwamish Waterway (LDW) and covers a total of approximately 18 acres. The uplands portion of the Property covers approximately 13.68 acres of the land, and approximately 4.19 acres of the Property is submerged, forming an embayment referred to as Glacier Bay. (GLACIER06561, at GLACIER06575) The focus of this expert report is on the uplands portion of the Property, as the investigation and remediation of the aquatic portion of the Property is being addressed as part of the Lower Duwamish Waterway (LDW) CERCLA Remedial Design/Remedial Action process.

The Property is occupied by a cement storage and distribution terminal that was constructed by Hanson in the 1960s and is currently owned and operated by Glacier Northwest, Inc. (Glacier). (GLACIER06561, at GLACIER06575)

2.1 OWNERSHIP HISTORY

Sometime between 1913 and 1922, the Port of Seattle (Port) filled a large portion of the Property with material dredged from the east-adjacent LDW. (GLACIER06561, at GLACIER06578) The aquatic portion of the Property was owned by the Port between approximately 1911 and 1973. (GLACIER06561, at GLACIER06578-79) King County purchased the upland portion of the Property in 1918 and owned it until 1943. The uplands portion of the Property was briefly owned by Henri Carlisle between April and July of 1943, when it was purchased by the U.S. Government, which owned the uplands portions of the Property until it was sold to the Port in 1964; at that time, the Port owned both the uplands and aquatic portions of the Property. Kaiser (Hanson) purchased the entire Property in 1973 and sold it to Lone Star Industries, Inc. (LSI) in April 1987, which transferred it to Lone Star Northwest, GP in December of that same year. Onoda Northwest purchased the entire Property in April 1991, transferring it to Lone Star later that month. Glacier purchased the entire Property in April 1991 and has owned it since that time. (GLACIER06561, at GLACIER06578)

2.2 PRE-HANSON HISTORY OF OPERATIONS AND IMPROVEMENTS

Several industrial operations that resulted in widespread contamination to soil, groundwater, and sediments operated on the Property prior to Hanson's first involvement with the Property in 1965.

2.2.1 Mineralized Cell

Between 1936 and 1939, Mineralized Cell Wood Preserving Company (Mineralized Cell) leased the Property from King County to operate a wood treatment facility. Mineralized Cell's operations included the introduction of a solution containing arsenic, copper sulfate, zinc sulfate, and other chemicals into logs stored on the southern portion of the Property. Untreated logs were delivered

to the Property via the LDW. As depicted on the 1936 aerial photo included on Figure 2, Mineralized Cell's operations covered much of the Property, and included a dock that was situated on the northeastern portion of the Property and small structures on the southern portion of the Property that were used for the storage and application of the arsenical solution. The solution was reportedly introduced to one freshly cut end of a log until such time as the solution emerged from the other end of the log and dripped directly onto the ground, which would have resulted in significant contamination of soil and groundwater. (GLACIER06561, at GLACIER06581-82)

Photographs and descriptions of the wood preservation operation show leaks, spills, and direct discharge of wood treatment chemicals in the former wood preservation area on the southern portion of the Property. (GLACIER06561, at GLACIER06649) As evidenced by a 1937 photo, housekeeping practices employed by Mineralized Cell were very poor, with piles of potentially contaminated wood waste and the equipment used in the chemical injection process strewn about the Property (Appendix A). (GNW_00027958, at GNW_00027959) Vehicle access roads are visible entering the Property from two locations along the western Property boundary, as well as extending from the northeastern portion of the Property onto the north-adjacent property. Contaminated soil from Mineralized Cell's operations would have been tracked along these access roads, further distributing the contamination to other portions of the Property.

Although additional records regarding Mineralized Cell's operations on the Property were not available, its waste handling practices at a facility located on the east side of the LDW were described in a 1945 report, which indicated that the chemical storage tanks used by Mineralized Cell at that location were washed twice daily, with the sludge and remaining chemicals draining directly onto the ground. Fuel oil supply tanks reportedly overflowed during filling events, with the oil discharging directly to the ground. (B-DUW-2157514, at B_DUW-2157524-25) It is reasonable to conclude that similar operational practices were employed by Mineralized Cell at its facility on the Property.

There is no record of a stormwater system in operation during Mineralized Cell's period of operations, and it appears that stormwater either percolated into the ground, where it would have resulted in significant impacts to groundwater and deeper soil, or flowed overland to the east before discharging to the LDW.

Based on the operational practices evident in photos taken of its facility, Mineralized Cell's operations would have resulted in widespread impacts to soil and groundwater beneath the uplands portions of the Property by arsenic, copper, and zinc, with the highest concentrations situated on the southern portion of the Property where the log treatment activities and chemical storage occurred. Surficial releases of the arsenical solution at the Property would have infiltrated the soil and, due to arsenic's high solubility, resulted in impacts to groundwater, which then would have migrated to the south and east via groundwater flow to other downgradient areas of the Property. These impacts would have also migrated via the overland flow of surface water that came into contact with the arsenical solution, as well as being transported via vehicle traffic along the access roads that are visible in the 1936 aerial photo and the loading dock where treated logs were likely transported.

2.2.2 Whetlerite Manufacturing

In 1940, the U.S. Government awarded a contract to the Carlisle Lumber Company (Carlisle) to construct a charcoal and Whetlerite manufacturing and testing facility on the Property. (GLACIER06561, at GLACIER06582-83) Information regarding the volume of soil that may have been excavated in the course of the facility's construction or the location where the excavated

soil may have been disposed of is not available. Construction was reportedly completed in 1942 and Carlisle operated the facility between August 1942 and February 1943, when the contract was transferred to Crown Zellerbach Corporation (Crown Zellerbach), which operated the facility from February 1943 to November 1944. Throughout this period, the Chemical Warfare Service (CWS), as the agent for the U.S. Government, performed chemical testing of the Whetlerite. (GLACIER06561, at GLACIER06582)

Operations at the facility included the manufacturing and testing of Whetlerite, a product made from activated carbon that is impregnated with copper, silver, or chromium for use in gas masks. (GLACIER06561, at GLACIER06582; KC_00528488, at KC_00528507; FED0003835, at FED0003836; FED0003342, at FED0003345) At peak capacity, the plant produced five tons of charcoal and two-and-a-half tons of Whetlerite per day. (GLACIER06561, at GLACIER06582) Before ceasing operations in November 1944, the United States Army and its contractors produced 5.2 million pounds of charcoal and 2.6 million pounds of Whetlerite at the plant. (GNW_00028368, at GNW_00028407)

The Whetlerite facility's production areas, laboratories, warehouses, offices, chemical storage tanks, transformers, underground storage tanks, a septic tank, and railroad spurs were situated on the northern portion of the Property (Figure 3). A drainage ditch traversed the entire southern portion of the Property in an east-west direction and discharged to the LDW. (GNW_00045737, at GNW_00045863) Spent carbon generated during the Whetlerite manufacturing process would have contained elevated concentrations of arsenic, copper, and zinc, as well as dioxins/furans (D/Fs). (GLACIER06561, at GLACIER06650-51) The spent carbon was reportedly incinerated or disposed of in pits and drainage ditches throughout the Property, and liquid wastes from the laboratory were reportedly disposed of in the septic system on the northeastern portion of the Property. (GNW_00045737, at GNW_00045776-77) According to a 1945 report, the manufacturing process included an approximately 750-gallon wash tank that contained a copper ammoniate solution. The tank was reportedly cleaned out monthly and initially drained directly to the LDW, but it was later recommended that the waste material be "dumped onto an adjacent, vacant field." According to the 1945 report, "This field was already being used as a dumping ground for discarded charcoal and sawdust." (B-DUW-2157514, at B-DUW-2157524-25) The on-Property disposal of liquid and solid wastes in this manner would have resulted in lasting impacts to soil and groundwater at the Property, as evidenced by the discovery of charcoal, sawdust, and/or briquettes at "numerous locations," during the remedial investigation of the Property. (GLACIER06561, at GLACIER06650-51)

2.2.3 Reichhold Chemical

Reichhold Chemical (Reichhold) leased the Property from the U.S. Government between 1946 and 1961 (RH00005602, at RH00005603) and manufactured resins, glues, and chemicals at the Property between approximately 1947 and 1958. (RH00005602, at RH00005604) Reichhold also manufactured pentachlorophenol (PCP) at the Property between 1953 and 1956. (RH00005602 to RH00005604)

As depicted on Figure 4, Reichhold constructed a new boiler house, a tank farm area to store chemicals used in the manufacturing process, plants for the production of PCP and sodium pentachlorophenate, a plant for the production of formaldehyde, as well as sewer systems, roads, fencing, and a railroad spur. (GLACIER06561, at GLACIER06583-84) Most of these improvements were situated on the northern portion of the Property.

Eleven aboveground storage tanks (ASTs) are first visible in the central portion of the Property in an aerial photo taken in 1951. (GNW_00045737, at GNW_00045914) Reichhold used the ASTs, which were reportedly situated within an unlined containment area, to store methanol, formaldehyde, phenol, urea (solid), chlorine, sodium hydroxide, and hydrochloric acid. (GLACIER06561, at GLACIER06583) The aboveground storage of these material in an unlined tank farm presents a significant risk of impacts to the underlying soil and groundwater. The ASTs were removed by 1961, when Reichhold vacated the Property. (GLACIER06561, at GLACIER06583)

Reichhold constructed a washwater impoundment area adjacent to the shoreline on the eastern portion of Property (Figure 4). The impoundment area was reportedly constructed in 1955 and was used to “collect process water for treatment and infiltration into the soil.” According to the ERM RI, the impoundment was closed in 1960. (GLACIER06561, at GLACIER06583) However, the impoundment was not visible in aerial photos taken after 1956. (GNW_00045737, at GNW_45918) While in use, the washwater impoundment would have collected water containing PCP, D/Fs, and other contaminants of potential concern (COPCs) that would have percolated into the underlying soil, resulting in impacts to soil and groundwater, especially along the Property’s eastern shoreline.

Two rail spurs occupied the Property during Reichhold’s period of operations. One of the spurs ran along the Property’s northern boundary and the other extended south through the central portion of the Property to access the east side of the tank farms (Figure 4). (GLACIER15394, at GLACIER15405) The loading and transporting of chemicals via these rail spurs would have increased the potential for releases to occur outside the production and storage areas.

Several drainage ditches are visible on the Property during Reichhold’s period of operations. (GNW_00045737, at 00045912-923) The unlined drainage ditches reportedly conveyed Reichhold’s process water to the washwater impoundment area. The drainage ditches also conveyed stormwater, which was discharged directly to the LDW. (GLACIER06561, at GLACIER06584) Process water in the ditches and impoundment area would have infiltrated and impacted soil and groundwater.

Laboratory waste and sanitary sewage were also conveyed to a septic tank in the northern portion of the Property, with liquid waste discharging from the tank to the LDW. Process water was directed to a wooden tank located at the northern portion of the Property for treatment prior to discharge to the washwater impoundment.

Chemical products and process wastes were discharged to the ground surfaces, significantly impacting soil and groundwater. These poor “housekeeping” practices resulted in multiple spills at the Reichhold facility that were reported between 1948 and 1955, as described below (RH_00005707 at RH_00005711-12):

- **December 1948.** 8,000 gallons of formalin and several drums of concentrated ammonia was discharged to the LDW.
- **April 1953.** There were reports of green-colored discharges from an outfall. This observation prompted an investigation that identified phenol, formaldehyde, urea, blood, and resins in sumps that were being conveyed and discharged at the washwater impoundment.
- **August 1953.** A fluorescent, white precipitate was observed in the LDW and attributed to a leak of 500 pounds of a glue product.

- **December 1953.** A fish kill was attributed to 8,000 gallons of formalin being transferred to a surface water drainage ditch that subsequently discharged to the LDW.
- **June 22, 1955.** A large fish kill led to an investigation that attributed the incident to a phenol spill (phenol concentration of 18,000 parts per million and pH of 3.8). Another spill, two weeks later, indicated that phenol was leaking from the drainage ditch along the southern boundary of the Property and discharging to the LDW.

On October 18, 1956, the State of Washington Pollution Control Commission issued a Waste Discharge Permit to Reichhold that allowed for the discharge up to 510,000 gallon per day of cooling water and contaminated water to the LDW if various discharge criteria were achieved (e.g., pH between 6.5 and 8.5 and phenol concentrations below 1 part per million). (RH_00000550, at RH_00000580)

Historical and existing transformer locations are shown on Figure 2-4 of the ERM RI (GLACIER15394, at GLACIER15399). During the U.S. Government's ownership of the Property, one transformer enclosure was located at the United States Army Building 7 (GLACIER02873, at GLACIER02874) During Reichhold's lease of the Property from the U.S. Government, one transformer enclosure was located at Reichhold Building 7 and one fenced transformer station was located south of Boiler House Building 21 (GLACIER02873, at GLACIER02874). An inventory of equipment at the Property in 1963 shows there were two transformers (located in Building 9 and 21 of the Reichhold operations). (GLACIER06561, at GLACIER06584) Acknowledging that the inventory was prepared two years before Hanson's involvement with the Property, it is unknown whether the transformers were present on the Property at the onset of Hanson's lease.

2.3 HANSON'S HISTORY OF OPERATIONS AND IMPROVEMENTS

The Port purchased the Property in 1964 and began leasing to Hanson in 1965. (GLACIER06561, at GLACIER06584) Between 1965 and 1969, Hanson leased the Property from the Port and built a cement storage and distribution terminal on the Property (Figure 5). Lease documents between Hanson and the Port indicate that "Lessee shall fill and improve the lease premises by making improvements...as it deems necessary...." (KC2005739, at KC2005744) The lease also required that the plans for improvement "shall be subject to approval in writing by the Port before the original construction." (KC2005739, at KC2005744) Hanson continued to lease the Property from the Port until 1973, at which point Hanson purchased the Property from the Port. (GLACIER06561, at GLACIER06585)

Hanson entered into an agreement with Duwamish Shipyards, Inc. (DSI), which operated on the north-adjointing property, to remove two of the former Reichhold buildings from the Property in September 1965. (KC2005959; KC2005961) Demolition of the remaining former Reichhold structures began on September 28, 1965. (KC2008182) The Roy Moseley Company was contracted to remove the former boiler building from the Property in 1966. (KC2005946) In 1966, the McFarland Wrecking Company was contracted to remove all existing building structures, except the office building, concrete building, and machinery foundations from the Property. (KC2008714) As indicated in Section 2.2.3, the 11 ASTs that had been installed and used by Reichhold were removed from the Property by 1961, before Hanson's operations at the Property began.

Hanson constructed the existing cement receiving dock on the eastern portion of the Property in 1967. (KC2012876) A piling plan for the receiving dock indicates that 42 three-ton piles, 12 sixty-ton piles, 12 eighty-ton piles, and 8 six-pile dolphins were used during the construction of the dock. (KC2006065)

Between 1968 and 1969, Hanson constructed a bulk cement storage and distribution facility on the Property. (KC2005831) Cement was removed from ships, barges, and railroad cars and transported on conveyor belts to silos and then distributed to cement trucks. A truck wash station was located on the western portion of the facility. (KC2005831) New docking facilities and an enclosed ship unloader were constructed on the Property in 1981. (KC2000890, at KC2000890) An oil storage room and a maintenance shop are depicted to the east of the storage silos on an undated map showing stormwater runoff. (KC2012911)

Cement types received at the Property included bulk shipments of American Society of Testing Materials Types I and II, Oil Well, Rapid Hardening, and High Early. (KC2006272; KC2006218) Reports documenting the specific quantities and any results of analytical testing of cement stored at the Property were not contained in the available records, but the raw materials used in Hanson's operations (cement) would not have contained concentrations of COPCs that could have resulted in impacts to the Property. During an inspection by the Washington State Department of Ecology (Ecology) in 1972, the cement transfer process was noted by Ecology as being "accomplished with no visible spillage and very little dust." (RH_00000767, at RH_00000777)

The Washington State Pollution Control Commission issued a permit to Kaiser (Hanson) for the daily discharge of up to 4,000 gallons of non-contact cooling water at the Property in 1969. (RH_00000767, at RH_00000874) In 1972, Kaiser received a permit for the discharge into the LDW of non-contact cooling water for air compressors and water from a truck wash. (RH_00000767, at RH_00000863) The discharge point outfall was located immediately south of the cement loading dock. (RH_00000767, at RH_00000862) Ecology issued a waste discharge permit under the National Pollutant Discharge Elimination System to Kaiser in 1974, which authorized a maximum of 30,000 gallons per day of non-contact cooling water and 26,000 gallons per day of truck wash water. (RH_00000767, at RH_00000822) During an inspection by Ecology in 1977, the discharge appeared to be "reasonably clear," and cooling water had been converted from a continuous discharge to a discharge only when operating. (RH_00000767, at RH_00000775)

In a 1974 aerial photograph, a light-colored substance can be seen on the southeastern portion of the Property (Figure 5). (KC2012906) According to interviews with former Kaiser employees, bentonite was mistakenly pumped into a cement silo, then discharged to the ground surface, which is the source of the light-colored substance visible in the 1974 aerial photo. (GLACIER03561, at GLACIER06585)

Based on review of aerial photographs and observed changes in the shoreline, fill material was placed along the shoreline of the Property in the late 1960s. (KC2012912, at KC2012939; GNW_00028118, at GNW_00028162). Between 1967 and 1968, portions of the shoreline were extended as much as 57 feet eastward relative to the shoreline that existed in 1963 (prior to Hanson's involvement with the Property). However, other areas of the shoreline were not expanded at all, particularly in the northeastern portion of the Property (Figure 5). In total, the shoreline expansion increased the uplands portion of the Property by approximately 15,743 square feet (0.36 acres).

Although the current ERM RI contends that the material placed along the shoreline originated from the excavation of soil during construction of the cement terminal on the Property, no documentation regarding the source or pre-placement chemical composition of the fill material has been identified by Glacier or Hanson. (KC2011879, at KC2011936) In the 2015 draft of their RI, ERM confirmed that "the source of the material used to fill the shoreline of the Property is unknown." (GNW_00028368, at GNW_00028387). There is also no evidence that Hanson was aware, at the time when its construction activities were conducted, of any impacts to soil, groundwater, or sediments of the Property from the

historical operations that predated Hanson's period of operations, as the first environmental investigation of the Property did not occur until 1985, long after the shoreline expansion was completed. (KC2005992)

Regardless of whether the material placed along the shoreline originated from soil that had been excavated from the Property or from material that was imported from another property, the fact remains that there is no evidence that Hanson's redevelopment or operational activities resulted in any increase in the mass of contamination at the Property.

Terminal 115 (T115), which is owned by the Port, is situated adjacent to the south of the Property. The northeast corner of T115's shoreline (adjacent to the southeast corner of the Property's upland area) was expanded slightly by the Port in 1963 and expanded again to its current configuration in 1970 (Appendix A). (GLACIER06561, at GLACIER06587-88) In their expert report prepared on behalf of Glacier for the LDW allocation effort, Geosyntec speculated that material excavated during construction of the cement terminal may have been transported to the south-adjointing T115 property to be used as fill during the expansion of that shoreline, which involved the placement of nearly 2 million cubic yards of material. (GNW_00045737 at GNW_00045797) Although there is no evidence to support this speculation, much less that Hanson participated in the redistribution of impacts from one Port-owned property to another, if true, that action would have resulted in a net decrease in the mass of contamination at the Property.

Prior to construction of the cement terminal on the Property, ditches were historically used by Property owners and operators to convey stormwater and process water from the Property to the LDW. (GLACIER06561, at GLACIER06578) In 1975, Hanson reportedly installed a stormwater system in the southern portion of the Property that included a 15-inch diameter concrete stormwater pipe with five catch basins. This system tied into the 48-inch diameter Seattle Public Utilities (SPU) stormwater line located south of the Property and within the City of Seattle easement on the T115 property. (GLACIER06561, at GLACIER06578) The new stormwater system would have reduced the infiltration of stormwater through the contaminated soil of the Property, thereby reducing the potential risk of additional impacts to groundwater. An investigation of the stormwater system conducted in 2014 revealed that the stormwater system was abandoned some time prior to 1991. Samples of solids that had collected in the stormwater pipe were found to contain elevated concentrations of arsenic, copper, zinc, and D/Fs. However, no evidence of a breach in the 15-inch stormwater pipe was reported during the test pitting or camera survey conducted during the investigation, and the material surrounding the pipe exterior was compact soil, as opposed to coarse bedding material that could have acted as a preferential pathway for contaminant migration. (GLACIER06561, at GLACIER06611) As such, it is reasonable to conclude that the construction of a stormwater sewer system would have resulted in a net improvement to the environmental conditions at the Property. The ERM RI concluded that "The historical stormwater system is considered an insignificant historical transport mechanism" at the Property. (GLACIER06561, at GLACIER06655)

The transformers that had been utilized by Reichhold and other previous operators at the Property and which likely contained polychlorinated biphenyls (PCBs) were removed when the buildings that Reichhold had most recently occupied were removed. Hanson installed new transformers during the construction of the cement terminal. These new transformers were not considered to be a potential source of PCB impacts, as the ERM RI concluded by stating "...the presence of electrical equipment containing PCBs ceased as a primary source when the older electrical equipment was removed from the Site between 1964 and 1969." (GLACIER06561, at GLACIER06656)

2.4 POST-HANSON HISTORY OF OPERATIONS AND IMPROVEMENTS

Hanson operated the cement terminal at the Property from approximately 1968 until 1987, when it was sold to LSI. (GLACIER06561, at GLACIER06585-06586) Between 1987 and 1991, Ash Grove Cement West, Inc. (Ash Grove) leased the Property from LSI for continued use as a cement terminal and added a vacuum ship unloader and replaced the conveyor system with a pneumatic system to convey cement to the storage silos. (GLACIER06561, at GLACIER06586) Glacier acquired the Property in two separate conveyances in 1991. (GLACIER06561, at GLACIER06586)

Glacier currently operates the bulk cement storage and wholesale distribution terminal located on the northern portion of the Property. The southern portion is not involved in cement terminal operations and is currently used for vehicle and equipment storage, warehousing, and maintenance. A stormwater swale and outfall are located in the central portion of the Property. With the exception of the vacuum ship unloader and pneumatic system that was installed between 1987 and 1991 by Ash Grove, replacing the previous conveyor system used by Hanson, the current operations at the facility appear similar to those during Hanson's period of operations. (GLACIER06561, at GLACIER06586)

2.5 HISTORY OF ADJOINING PROPERTIES

Following is a brief discussion of the current and historical uses of adjoining properties.

2.5.1 Duwamish Shipyards, Inc.

The north-adjoining DSI property is currently used for container storage. Between the 1940s and mid-2000s, DSI operations included the repair and maintenance of floating vessels, including tug boats, barges, dredges, fishing vessels, and small passenger vessels. (GLACIER06561, at GLACIER06586) DSI ceased shipyard-related activities at the DSI property in 2007. (GLACIER06561, at GLACIER06587) The boundaries of the Property were adjusted in 1964, prior to Hanson's lease of the Property, and as a result several historical features associated with Reichhold's operations, including the septic tank and waste treatment tank, were located on what is now the DSI property. (GLACIER06561, at GLACIER06582)

2.5.2 Terminal 115

The Port owns and operates T115, which is located along the western shore of the LDW and abuts the southern boundary of the Property. The LDW was dredged to straighten and deepen the waterway between 1913 and 1922. Within this time frame (1915 to 1917), T115 was also dredged. (GLACIER06561, at GLACIER06587). Fill activities at T115 were observed in the 1930s, 1940s, 1950s, 1960s, and early 1970s, with the eastern portion of T115 being filled with gravel, sand, silt, concrete, bricks, coal, wood, garbage, and other miscellaneous materials between 1963 and 1970 (Appendix A). (GLACIER06561, at GLACIER06587) The Port's filling activities extended a short distance onto the southeasternmost portion of the Property and created the southern shoreline of Glacier Bay (Figure 5).

T115 is currently occupied by several seafood facilities, cargo storage and transfer operations, vehicle maintenance facilities, and a commercial fleet vehicle refueling station. (GLACIER06561, at GLACIER06587) Historical operations of T115 have included former Boeing Plant #1; retail gasoline service; vehicle maintenance; salvage, gravel and concrete production; and a tin reclamation facility. (GLACIER06561, at GLACIER06587)

The tin reclamation facility was located on the northern portion of T115, immediately adjacent to the Property. The facility reclaimed tin from scrap steel and recycled tins cans between 1963 and

1998. (GLACIER06561, at GLACIER06587) Process waste generated during the tin reclamation process included spent plating solutions and black mud filtrate that discharged to Glacier Bay via a surface drainage ditch on the southeastern portion of the Property. (GLACIER06561, at GLACIER06588) Aerial photographs show a light-colored plume of accumulated sediment or liquid being discharged into Glacier Bay near the Property's southeast corner (Appendix A). (GLACIER06561, at GLACIER06588) An investigation of the tin reclamation facility by the Port identified metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, tin, and zinc), semivolatile organic compounds (including polycyclic aromatic hydrocarbons), petroleum, and volatile organic compounds in soil and groundwater samples. The samples were not analyzed for D/Fs, but D/Fs were identified in soil and sediment at the discharge location of the wastewater and stormwater released from the former tin reclamation facility. (GLACIER06561, at GLACIER06658)

2.5.3 Lower Duwamish Waterway

The LDW Superfund Site, located adjacent to and east of the Property, extends over the northern 5 miles of the Duwamish River to the southern tip of Harbor Island. In September 2001, the LDW was listed on the National Priorities List. The United States Environmental Protection Agency (USEPA) and Ecology have divided lead-agency responsibilities for the cleanup of the LDW and for uplands source control, respectively. In December 2000, the Lower Duwamish Waterway Group, consisting of the City of Seattle, King County, the Port, and Boeing entered into the Administrative Order on Consent with the USEPA and Ecology to conduct a remedial investigation (RI)/feasibility study (FS) pursuant to both CERCLA and Washington State Model Toxics Control Act. The RI and FS were completed in 2010 and 2012, respectively, and the USEPA issued the LDW Record of Decision in November 2014. The selected remedy for sediments applies to the portion of the LDW extending up to the elevation of 11.3 feet above mean lower low water. Liability for the impacts in the LDW, including the submerged portions of the Property within Glacier Bay, is currently being allocated. (GLACIER06561 at GLACIER06573, 06587-06588)

3.0 PREVIOUS INVESTIGATIONS AND INTERIM ACTIONS

Shannon & Wilson, Inc. conducted a geotechnical Foundation Investigation on behalf of Kaiser Engineers in 1966, prior to the construction of the cement terminal. The general subsurface conditions were comprised of loose sand, identified as fill material, overlaying soft organic clay, medium-dense sand, medium silt, medium dense sand with shells, and hard silt. (POS_00287137) No evidence of an environmental investigation conducted on behalf of Hanson or prior to Hanson's period of ownership or operation at the Property has been identified to date. However, two investigations were completed on behalf of others during the time that Hanson owned the Property. JRB Associates performed a preliminary assessment evaluation of the Property on behalf of the USEPA and Ecology on September 7, 1984. That assessment indicated that USEPA concluded "there is no evidence that hazardous waste is, or ever was, disposed of on-site." (KC2009770, at KC20099771-76)

Parametrix conducted an Environmental Audit of the southern portion of the Property on behalf of the Port in 1985. During the audit, 29 soil borings were advanced on the Property and four composite soil samples were submitted for laboratory analysis for priority pollutants. Arsenic and phthalates were detected in the soil samples. Other chemicals of concern, including volatile organic compounds, semivolatile organic compounds, carcinogenic polycyclic aromatic hydrocarbons, and PCP were not detected. (KC2005992, at KC2006007-6014)

A number of environmental investigations have been conducted at the Property since 1985, which have revealed significant impacts to the Property as a result of releases that occurred prior to Hanson's operation or ownership of the Property. Details regarding these investigations are provided in the ERM RI. (GLACIER06561, at GLACIER06602-04)

Based on previous investigations, PCP impacts were primarily located in two areas of the Property where Reichhold formerly operated a PCP production plant and where Reichhold impounded washwater. (GLACIER06561, at GLACIER00608) An ozone sparging system was installed to treat PCP in groundwater in the shallow aquifer at the Property in the two areas and consisted of 22 sparge wells in the former PCP production plant area and 29 sparge wells in the washwater impoundment area of the Property. (GLACIER06561, at GLACIER00608) A soil vapor extraction system was also installed as a protective measure to capture ozone that was not oxidized in the subsurface. The in situ ozonation system operated between May/April 2000 to October 2005. (GLACIER06561, at GLACIER00608)

Based on previous investigations, arsenic impacts were primarily located in the southern portion of the Property where Mineralized Cell formerly operated. (GLACIER06561, at GLACIER00608) Dissolved arsenic in shallow groundwater was treated by an oxidative process using hydrogen peroxide to geochemically fix arsenic in the subsurface. The hydrogen peroxide infiltration gallery was constructed in the south-central area, and approximately 20,000 gallons of 3 percent hydrogen peroxide solution was piped into an infiltration gallery during two treatment events performed in 2000. (GLACIER06561, at GLACIER00608)

ERM completed a DRAFT Remedial Investigation/Feasibility Study Report—Volume 1 for the Property in 2018 on behalf of Glacier, dated January 24, 2020. A draft of Volume 2 of the report, which contains the FS components, was required to be delivered by May 1, 2020, but was not provided to Hanson until May 8, 2020. The delay in delivery did not provide sufficient time to review and incorporate the findings of the FS into this expert report.¹ As such, the discussion below relies only on the information provided in Volume 1 (the ERM RI), which outlines ERM's findings and conclusions regarding their RI of the Property. (GLACIER06561) Had the FS components contained in Volume 2 of that report, which was dated April 30, 2020, been made available earlier, it may have allowed for an assessment of the remedial alternatives that were considered for use at the Property, as well as the estimated costs associated with those alternatives, including the recommended alternative. However, acknowledging that neither the RI nor the FS has been approved by Ecology under the ongoing Agreed Order process, it would be premature to assume that Ecology will concur with the findings or conclusions of either volume of the report. Additional information regarding the distribution of impacts is provided in the ERM RI and in later sections of this report.

Soil samples collected in the course of the ERM RI contained concentrations of arsenic, copper, zinc, PCP, polycyclic aromatic hydrocarbons (PAHs), D/Fs, PCBs, diesel-range petroleum hydrocarbons (DRPH), and oil-range petroleum hydrocarbons above their respective screening levels (SLs). (GLACIER06561, at GLACIER06620-27) Arsenic, copper, DRPH, PCP, and D/Fs were detected in groundwater at concentrations above their respective SLs. (GLACIER06561, at GLACIER06627-31) Dissolved arsenic was detected in seep samples collected along the shoreline of the Property at concentrations exceeding the SLs. (GLACIER06561, at GLACIER06631)

¹ I reserve the right to supplement this expert report to the extent that the documents or information not revealed by Glacier at the original May 1, 2020, production date could affect my findings or opinions expressed herein.

4.0 GEOLOGY/HYDROGEOLOGY

The following is a summary of findings regarding the geology and hydrogeology of the Property, as described in the ERM RI. (GLACIER06561)

4.1 FILL MATERIAL

The shallow lithologic units at the Property consist of native Duwamish tidelands deposits (the lower sand and silt aquitard units) overlain by fill. (GLACIER06561, at GLACIER06589) According to the expert report prepared by Geosyntec on behalf of Glacier for the LDW allocation effort, two layers of fill are present beneath the Property, including a layer of shallow fill located above a layer of dredged fill that originated during historical dredging events from the east-adjacent LDW between 1913 and 1922. (GLACIER06561, at GLACIER06580-81) Information regarding the chemical composition of the dredged material at the time of its placement was not available, but the dredged fill may have contained elevated concentrations of metals, petroleum, and other COPCs that were in use by the industrial operators along the LDW prior to 1922. The shallow fill at the Property was placed over the dredge fill in multiple events, beginning as early as 1922. The source(s) of the fill and its chemical composition at the time of placement on the Property are unknown, but such fill materials commonly contain metals, petroleum, and other COPCs, especially if the fill originated from dredged material or from material imported from other industrial facilities. Considering that the shallow fill material is present throughout most of the Property, widespread distribution of the COPCs that may have been present in the shallow fill at the time of placement should be anticipated.

The layer of shallow fill material, consisting of silt, sand, gravel, brick, carbon/charcoal, and concrete debris is generally continuous across the Property and extends to a depth of approximately 3 to 5 feet below ground surface (bgs). The dredged fill is approximately 4 to 9 feet thick and is generally continuous beneath the upland portion of the Property. The dredged fill overlies the silt aquitard, which in turn overlies a lower sand unit. (GLACIER06561, at GLACIER06589-92)

Although not described as such in Geosyntec's expert report, the ERM RI lists a third type of fill material, which ERM defines as "bank fill." This material is situated east of the wooden bulkhead that formed the 1922 shoreline of the Property, and ERM suggests that this material originated from construction activities related to Hanson's redevelopment of the Property. The bank fill reportedly consists of heterogenous mix of silt, sand, gravel, and construction debris such as bricks, wood, and concrete. The bank fill along the riverbank was identified from the surface to depths ranging between 1.25 and 14 feet bgs. (GLACIER06561, at GLACIER06591) The bank fill ranges in thickness from 0 to 14 feet bgs, and its average thickness is approximately 8 feet. The fill material located along the eastern shoreline is protected by rip rap, which armors the shoreline and prevents bank erosion from occurring. (GLACIER06561, at GLACIER06591)

T115 has undergone significant filling, a majority of which occurred between the 1950s and 1971. (GLACIER06561, at GLACIER06587 and GLACIER06659) As seen on aerial photos taken in August 1961 and June 1963, the portion of T115 that abuts the southeastern corner of the Property was expanded during this time frame, prior to Hanson's operations at the Property. (GNW_00045737, at GNW_00045923-24) A photo of the Property shoreline taken in August 1963 shows what appears to be concrete debris (Appendix A). (GLACIER05453, at GLACIER05470) A comparison of the 1936 and 1963 shorelines of the Property, depicted on Figure 2-21 of the ERM RI, reveals that approximately the southern third of the Property's shoreline was expanded eastward by as much as nearly 20 feet, which resulted in the creation of approximately 4,549 square feet of land, as shown on Figure 5. Acknowledging that this shoreline

expansion occurred by 1963, prior to Hanson's involvement with the Property, it is apparent that Hanson was not responsible for this expansion, and that fill material of unknown origin was placed along the Property's shoreline sometime between when Reichhold ceased operations and Hanson's tenure at the Property began. The U.S. Government owned the Property at the time that this material was placed along the Property's eastern shoreline. (GLACIER06561, at GLACIER06579)

Beginning in November 1969, the Port initiated a project to further expand T115 through extensive filling, dredging, and excavation. T115 was filled with 722,000 cubic yards of dredge spoils and 1.1 million yards of other fill material. (GLACIER06561, at GLACIER06659) The northernmost portion of the T115 expansion activities that extended as much as 55 feet onto the Property, forming the southern shore of Glacier Bay, was added between 1969 and 1970. (GLACIER06561, at GLACIER06592) The portion of the shoreline that extends onto the Property encompasses approximately 21,231 square feet of land (Figure 5).

4.2 GROUNDWATER FLOW

According to the ERM RI, two distinct saturated zones have been identified underlying the Property (a shallow unconfined aquifer and a deep confined aquifer). Shallow unconfined groundwater was encountered in the shallow and dredge fill beneath the Property at depths between 4 and 13 feet bgs. The saturated thickness of the shallow aquifer varies across the Property from 2 to 11 feet, and also experiences seasonal fluctuations of approximately 2 to 3 feet. This shallow aquifer lies above a silt aquitard. A deep confined aquifer is present in the lower sand, which lies beneath the aquitard and is fully saturated. (GLACIER06561, at GLACIER06594-99)

Groundwater elevations in the both the shallow aquifer and the deep aquifer fluctuate sinusoidally with time, indicating that both units are hydraulically connected to the LDW and are tidally influenced. The net groundwater flow direction in the shallow aquifer and deep aquifer is toward the LDW. Groundwater generally flows to the east–northeast in the northern portion of the Property, to the south and east in the central portion of the Property, and to the south–southeast in the southern portion of the Property. The average calculated groundwater flow velocity in the shallow aquifer is approximately 12.7 feet per year. (GLACIER06561, at GLACIER06598)

Based on water level data for five pairs of shallow and deep wells, there is a net downward vertical gradient between the shallow aquifer and deep aquifer. The shallow aquifer also discharges through seeps along the eastern bank of the shoreline to the LDW. (GLACIER06561, at GLACIER06596)

Groundwater elevation data indicate the presence of a depression in the southeastern portion of the Property. This depression in the groundwater table, likely caused by the 48-inch-diameter SPU stormwater line that runs parallel to and south of the Property, results in groundwater flow to the south from the Property and to north from T115 in the direction of the stormwater line. (GLACIER06561, at GLACIER06596)

4.3 SEDIMENTS

Sediments in the vicinity of the Property have been confirmed to contain arsenic, PCBs, carcinogenic PAHs, PCP, D/Fs, and numerous other contaminants of concern at concentrations exceeding their respective remediation actions levels. (SC_00036634 at SC_00036723) An allocation to establish liability for the cost to remediate the sediments of the LDW, including the sediments of Glacier Bay, is currently underway.

5.0 DISTRIBUTION OF IMPACTS

The magnitude and extent of COPCs in upland soil (saturated and unsaturated) are shown on ERM RI Report Figures 5-1 through 5-9. (GLACIER15394, at GLACIER15430-38) Groundwater COPC analytical results for the six most recent monitoring events are shown on ERM RI Report Figures 5-11 through 5-19 (Appendix B). (GLACIER15394, at GLACIER15440-48) According to the ERM RI, contouring was based on the maximum concentration detected between November/December 2011 and August/September 2015.

Figures 6 through 9 of this report depict the areas on the Property where arsenic, D/F, PCP, and PCBs are present at concentrations above their respective SLs in vadose soil, saturated soil, and groundwater, regardless of the affected media or magnitude of the exceedance. Although other COPCs are present at the Property, these four COPCs represent the vast majority of impacts at the Property and have the most significant impact on investigation costs. Figure 10 depicts the combined distribution of these impacts and also provides the calculated area of impacts from arsenic, D/Fs, PCP, and PCBs. In total, approximately 561,000 square feet of the Property's roughly 595,900 square feet of uplands is impacted by one or more of these four COPCs at concentrations exceeding the applicable SLs.

5.1 ARSENIC

The distribution of arsenic correlates closely with the operations of Mineralized Cell on the southern portion of the Property and the Whetlerite manufacturing areas on the northern portions of the Property. Arsenic impacts are also noted along the access roads that formerly traversed the southern, western, and northern portions of the Property, and proximate to the loading dock on the northeastern portion of the Property where treated logs were likely transported. Arsenic impacts on the southern portion of the Property may also be partially the result of spent carbon from the Whetlerite manufacturing/testing process being disposed of at those locations. Soil and shallow groundwater beneath the former impoundment area operated by Reichhold also exhibit exceedances of the arsenic SL, suggesting that the process water that was impounded in the basin contained arsenic.

As indicated on Figure 6, the only upland areas of the Property not having arsenic SL exceedances in at least one media of concern are its southwest corner, a narrow strip near its southeast corner, and two areas near its northern and northeast borders. The area beneath the silo on the northern portion of the Property has not been investigated for the presence of arsenic or other COPCs, which explains this relatively large apparent gap in the distribution of arsenic impacts in this area. Copper and zinc are also present in soil and groundwater at the Property at concentrations above their respective SLs, but their footprints (Figures 5-3 and 5-4 of the ERM RI) are almost entirely contained within the footprint of the arsenic impacts. (GLACIER15394, at GLACIER15432-33)

As shown on Figure 6, arsenic exceedances of the SL in soil and groundwater cover a total of 513,539 square feet (11.79 acres) of uplands at the Property. This area constitutes roughly 91 percent of all the areas on the Property where one or more of the four selected COPCs is present in soil or groundwater at concentrations above the applicable SL.

5.2 DIOXINS/FURANS

D/Fs toxicity equivalency quotients (TEQs) exceeding the SLs are generally situated in the former Reichhold operational areas, including the former washwater impoundment (GP-45), the former PCP production plants (GP-74), and the former tank farms (GP-49), as well as along the riverbank (TB-02B, TB-03D, TB-04A, TB-05B, and TB-06). The highest D/Fs TEQs detected at the Property were encountered in

boring TB-06, which is located on the southeastern corner of the Property, proximate to the former tin reclamation facility on the T115 property and the outfall of a drainage ditch that formerly ran along the southern boundary of the Property. Notably, boring TB-06 was advanced through material that was placed at that location between 1961 and 1963, prior to Hanson's involvement with the Property.

With the exception of boring TB-06, which is located proximate to several other potential sources of D/Fs, each of the four other riverbank sample locations along the Property's eastern shoreline where D/Fs have been detected above the SLs were situated immediately adjacent to the former wastewater impoundment area. Only two of these borings (TB02 and TB05) are situated east of the bulkhead that ERM defines as the western boundary of the bank fill, which they assert was placed by Hanson. The remaining riverbank borings were advanced through dredge fill material that was placed prior to Hanson's operations at the Property.

D/Fs were also detected above the TEQ SL in a soil sample collected from boring TB-07, located along the southern shoreline of Glacier Bay. This boring was advanced through material that was placed by the Port during the expansion of T115. None of the historical operations at the Property could have contributed to the impacts present at this location, and it is apparent that these impacts are entirely attributable to the Port's placement of fill material for the construction of T115.

Approximately the western third of the Property, as well as areas in the northeastern and south-central upland portion of the Property, have no D/Fs TEQ SL exceedances. The distribution of D/Fs in soil correlate closely to the operations of Reichhold, although some of the impacts from D/Fs may also have been the result of releases from the Whetlerite production operations by Carlisle, Crown Zellerbach, and the U.S. Government.

As shown on Figure 7, the total area of D/F impacts that exceed the TEQ SL for soil and groundwater on the Property is nearly 265,000 square feet, which constitutes approximately 47 percent of the impacted upland portion of the Property.

5.3 PCP

Vadose and saturated soil samples with reported PCP concentrations exceeding the SL are present in the northern, central, eastern, and southeastern portions of the Property in the former Reichhold operational areas, with the highest PCP concentrations primarily in the footprint of Reichhold's former wastewater impoundment area. Reichhold is the only known generator of PCP at the Property.

Saturated soil samples with PCP concentrations exceeding the SL are located primarily in the former Reichhold operational areas, including the location of the former wastewater impoundment (GP-44, GP-45, and GP-46), the location of the former PCP production plants (GP-2, GP-55, and GP-74), the location of the former phenate process area (GP-36), the location of the former southern drainage ditch (GP-16), and in the vicinity of the former laboratory building (GP-27, GP-28, and GP-54). The two saturated soil samples exhibiting PCP concentrations exceeding the SL are in the dredge fill beneath the location of the former wastewater impoundment area (GP-7) and the former drainage ditches on the southern portion of the Property (GP-16).

As shown on Figure 8, the total area of PCP impacts that exceed the SLs for soil and groundwater on the Property is nearly 175,000 square feet, which constitutes approximately 31 percent of the impacted upland portion of the Property.

5.4 PCBS

Isolated areas of PCB SL exceedances are present at 13 locations throughout much of the Property, including the location of each of the five current and former transformers that are identified on uplands portions of the Property on Figure 5-8 of the ERM RI (Appendix B). Inexplicably, when ERM correlated these PCB impacts with potential sources in Section 7.3.7 of the ERM RI, there is no mention of the fact that impacts are present at each of these five current and former transformer locations. Instead, ERM states that the PCB exceedances are "...limited to the riverbank with a few isolated areas in the north, west, and southern areas of the upland portion of the Site." (GLACIER06561, at GLACIER06647-48) The reason for ERM's failure to connect the most obvious source of PCBs with the impacts situated immediately beneath them is not evident, but it is not the only apparent oversight by ERM with respect to the distribution of PCB impacts at the Property. Section 7.4.1.7 of the ERM RI states that "Although extensive sampling was performed in the vicinity of the 1940s and 1960s era transformers, PCBs were not detected in these areas at concentrations exceeding SLs." This statement is incorrect; PCBs are described as having been detected at concentrations above the SL in 9 of the 12 vadose zone soil samples and 17 of the 63 saturated soil samples, including in samples collected in the vicinity of current and former transformers. (GLACIER06561, at GLACIER06625)

In addition to the vicinities of the current and former transformers, elevated concentrations of PCBs were also detected in the vicinity of other known sources of PCBs, including north of the cement silos along the northern Property boundary, where an electrical shop was formerly located (GP-28); on the northeast corner of the Property (TB-01) immediately south of a former sand blast shed (the former location of which is situated on what is now the DSI property); and two locations along the southern portion of the Property where drainage ditches formerly carried process water and contaminated stormwater (GP-83 and TB-06).

PCBs were encountered at concentrations above the SL in soil collected from several locations along the Property's riverbank (GP-72, TB-02, TB-03, TB-05). As was the case with D/Fs encountered along the shoreline, the samples containing elevated PCBs in riverbank samples were collected in the immediate vicinity of the former washwater impoundment, and only two of the four borings where elevated PCBs were detected in riverbank samples (TB-02 and TB-05) were situated east of the 1963 shoreline that was expanded in 1967–1968. Despite the fact that the impoundment received process waste and is known to be contaminated by multiple COPCs, ERM did not analyze any soil samples from within the impoundment basin for the presence of PCBs.

Finally, PCBs in excess of the SL were detected in soil collected from boring TB-07, located on the southern shoreline of Glacier Bay, in material that was placed by the Port during the construction of T115.

As shown on Figure 9, the total area of PCB impacts that exceed the SL for soil and groundwater on the Property is more than 76,000 square feet, which constitutes approximately 14 percent of the impacted upland portion of the Property.

6.0 RELATIVE CONTRIBUTION OF SOURCES

The vast majority of the impacts present at upland locations of the Property were caused by those parties with operations that included the hazardous substances that were directly or indirectly discharged to soil and groundwater at the Property. Those parties include Mineralized Cell, Carlisle, Crown Zellerbach, the U.S. Government, and Reichhold. Other owners or operators that are considered to potentially warrant an assignment of liability and are discussed in the following sections include the Port, King County,

Hanson, and Glacier. The various other parties that have owned or leased all or portions of the Property since 1965, when efforts to remove the remaining infrastructure associated with the operations that generated the impacts were initiated, are considered de minimis contributors to the impacts present at the Property and are not discussed further.

Assuming the Court first determines that Hanson qualifies as a liable party, then assignment of an appropriate percentage of liability for each of the parties with ownership or operational involvement at the Property requires the establishment of key equitable factors, which in this matter I consider to include the following:

- (1) Whether a party handled or used products containing the COPCs in its operations.
- (2) The degree of care exercised by a party to prevent the release or further spread of a release during its operations or period of ownership.
- (3) The magnitude and duration of the releases caused by a party.
- (4) The extent of the party's knowledge and awareness of the presence of contamination during their period of ownership/operation.
- (5) The anticipated relative cost associated with the investigation of the specific COPCs released by the party.
- (6) The distinguishability of impacts related to the party.

6.1 EQUITABLE FACTOR 1—WHETHER A PARTY USED OR HANDLED PRODUCTS CONTAINING THE COPCS IN ITS OPERATIONS

6.1.1 Mineralized Cell

Mineralized Cell operated a wood treatment facility at the Property between 1936 and 1939 under lease from King County, the Property owner at the time. (GLACIER06561, at GLACIER06579; GLACIER06581) Mineralized Cell's operation included the pressurized application of a solution containing arsenic, copper, and zinc into one end of a freshly cut log until such time as the solution passed through the log and dripped from the other end of the log onto the ground. (GLACIER06561, at GLACIER06581) A 1936 aerial photo showing Mineralized Cell's operation at the Property suggests that dozens, if not hundreds of logs were staged on the Property for treatment at any one time (Figure 2). A ground-level photo taken of the facility in 1937 depicts a shed containing what appears to be sacks of the chemicals used to make the wood treatment solution. (GNW_00028798, at GNW_00028799) Arsenic, copper, and zinc are all COPCs that are present in soil or groundwater at concentrations exceeding their respective SLs; as such, Mineralized Cell warrants a significant assignment of liability under this factor.

6.1.2 Carlisle, Crown Zellerbach, and U.S. Government

Under contract to the U.S. Government, which owned the Property at the time, both Carlisle and Crown Zellerbach operated a plant on the northern portion of the Property during the early 1940s that manufactured charcoal and Whetlerite, a product made by impregnating activated carbon with copper, silver, or chromium for use in gas masks. (GLACIER06561, at GLACIER06582) Following production, the Whetlerite was tested by the CWS, as the agent for the U.S. Government, using chemicals such as arsine, chloropicrin, cyanogen chloride, and phosgene. The facility was equipped with laboratories, chemical storage areas, underground storage tanks, and potential PCB-containing transformers. (GLACIER06561, at GLACIER06582) A report prepared in 1945 described an approximately 750-gallon tank containing copper ammoniate that was reportedly washed out once per month and dumped directly into the LDW or onto the ground of the Property. (GLACIER06561, at GLACIER06582) Chemicals used in the laboratory were

reportedly discharged to the septic system on the Property and solid waste was reportedly disposed of on the grounds of the Property. (GLACIER06561, at GLACIER06582) In addition to the copper, zinc, and other metals that were used in the manufacturing process and the arsenic that was used in the laboratory testing of Whetlerite, D/Fs were likely produced during the combustion of wood that contained zinc chloride. (GLACIER06561, at GLACIER06650) Arsenic, copper, zinc, PCBs, and D/Fs are COPCs that have been encountered at the Property above their respective SLs; as such, Carlisle, Crown Zellerbach, and the U.S. Government each warrant an assignment of liability under this factor. As both owner and operator of the plant, and as the party responsible for the disposal of arsenic from the laboratory testing process, the U.S. Government warrants a higher assignment of liability under this factor than do either Carlisle or Crown Zellerbach.

6.1.3 Reichhold

In the period between 1946 and 1961, Reichhold leased the Property from the U.S. Government and manufactured a number of chemicals and products, including resins, glues, formaldehyde, PCP, and sodium pentachlorophenate. (GLACIER06561, at GLACIER06583) D/Fs are a known by-product of the PCP manufacturing process. (GLACIER06561, at GLACIER06652) Reichhold's facility was also equipped with 11 aboveground tanks containing methanol, formaldehyde, phenol, urea, chlorine, sodium hydroxide, and hydrochloric acid. Liquid wastes generated during Reichhold's operations were discharged to a septic system, drainage ditches, a washwater impoundment area located along the shoreline of the Property, or directly to the LDW. (GLACIER06561, at GLACIER06652) Reichhold's chemical manufacturing process included the use and handling of PCP, phenols, and D/Fs. (GLACIER06561, at GLACIER06583-84) In addition, considering the time frame in which they were installed and used, transformers present on the Property during Reichhold's time of operations would certainly have contained PCBs. Reichhold historically generated the largest volume of the some of the most toxic COPCs at the Property, including phenols, PCP, PCBs, and D/Fs; as such, Reichhold warrants the most significant assignment of liability under this factor.

6.1.4 Hanson and Glacier

Hanson formerly operated the existing cement terminal on the Property and Glacier is the terminal's current operator. The cement terminal's historical and current operations are limited to the storage and distribution of cement; cement manufacturing has not been performed at the Property. (GLACIER06561, at GLACIER06576) Trace concentrations of naturally occurring metals are present in the cement that passes through the terminal prior to distribution, but the concentrations in cement are not high enough to be a source of contamination to the Property. Although small quantities of petroleum have been stored and used by each of the cement terminal operators at the Property, there is no evidence to suggest that any significant releases of petroleum occurred during the operations of any of these entities. Furthermore, there is no evidence to suggest that PCB-containing transformers have existed at the Property during the cement terminal's operations. As such, the operation of the cement terminal by Hanson and Glacier is not considered to be a source of COPCs to the Property and does not warrant the assignment of any liability under this factor.

6.2 EQUITABLE FACTOR 2—THE DEGREE OF CARE EXERCISED BY A PARTY TO PREVENT THE RELEASE OR FURTHER SPREAD OF A RELEASE DURING ITS OPERATIONS OR PERIOD OF OWNERSHIP

6.2.1 Mineralized Cell

A limited amount of information is available regarding Mineralized Cell's operations, including a 1936 aerial photo, a ground-level photo from a 1937 tax assessor record, a patent for a wood

treatment process, and a nearly contemporaneous description of their operations at a nearby facility on the east side of the LDW. (GNW_00027958, at GNW_00027959-60; GLACIER06561, at GLACIER06581) This limited information strongly suggests that Mineralized Cell made no effort to prevent a release of hazardous substances during their operations. The process of applying an arsenical solution to the logs involved allowing the solution to drip out of the logs and onto the ground as an indication of when the treatment was complete, so releases of the arsenical solution were an intended consequence of their operation. Furthermore, the 1937-vintage photo of their operations depicts equipment used to store and apply the chemical injectate strewn about the unpaved ground surface, along with piles of what appear to be wood shavings that may also have been contaminated by the solution applied to the logs. (GNW_00027958, at GNW_00027959) A description of Mineralized Cell's operations at a nearby facility in 1945 indicated that the storage tanks in which the solution was mixed were washed out twice daily and that any residual sludge or chemicals was drained onto the ground. The report also indicated that the fuel oil used to heat the solution during the mixing process would occasionally overflow from the supply tanks during filling and spill directly onto the ground. At least some of the treated wood at that facility was shipped via the LDW, which allowed for the recently applied chemicals to leach out of the wood into the waters of the LDW. (B-DUW-2157514, at B-DUW-2157524-25) Although the 1945 report did not describe the specific operations of Mineralized Cell at the Property, it is reasonable to conclude that similar practices were employed at both of these Mineralized Cell facilities. As such, Mineralized Cell warrants a significant assignment of liability under this factor. In addition, because King County was the Property owner and leased the Property to Mineralized Cell, King County was in the best position as among all other potentially responsible parties to exercise control and regulation over Mineralized Cell's operations. (GLACIER06516, at GLACIER06579) Therefore, to the extent Mineralized Cell no longer exists or cannot be located, King County would warrant responsibility for the liability being assigned to Mineralized Cell under this factor.

6.2.2 Carlisle, Crown Zellerbach, and U.S. Government

Carlisle and Crown Zellerbach each reportedly used a 750-gallon tank of copper ammoniate in their manufacturing process that was washed out once per month and drained into the LDW or dumped onto the ground at the Property. According to a 1945 report, the Property was also used "as a dumping ground for discarded charcoal and sawdust," some of which likely contained elevated concentrations of copper, zinc, and D/Fs from the Whetlerite manufacturing and laboratory testing processes. (B-DUW-2157514, at B-DUW-2157524-25) These disposal practices have been confirmed by the discovery of sawdust, charcoal briquettes, and other materials associated with the production of charcoal and Whetlerite during investigations of the Property. (GLACIER06561, at GLACIER06651) In addition, the chemicals used in laboratory testing performed by CWS on behalf of the U.S. Government were reportedly discharged to a septic system located within the former Property boundaries, which then discharged to the LDW. (GLACIER06561, at GLACIER06651) These disposal practices are not representative of a high standard of care, and as such, Carlisle, Crown Zellerbach, and the U.S. Government warrant an assignment of liability under this factor. As both owner and operator of the plant, the U.S. Government warrants a higher assignment of liability under this factor than do either Carlisle or Crown Zellerbach.

6.2.3 Reichhold

Reichhold appears to have behaved in the most egregious manner with respect to the degree of care taken in the handling and disposal of hazardous substances at the Property. They reportedly discharged much of the large volumes of process water from their PCP and other chemical

manufacturing operations directly to the LDW or to the drainage ditches that led to the LDW, installed numerous large ASTs within an unlined tank farm, and constructed a washwater impoundment area immediately adjacent to the LDW. (GLACIER06561, at GLACIER06583-84; GLACIER06652) While in use, the washwater impoundment would have collected water containing PCP, D/Fs, and other COPCs that would have percolated into the underlying soil, resulting in impacts to soil and groundwater, especially along the Property's eastern shoreline. The washwater impoundment also included an outflow that discharged to the LDW. (GLACIER06561, at GLACIER06652)

Laboratory waste was conveyed to a septic tank in the northern portion of the Property with liquid waste discharging from the tank to the LDW. Process water was also directed to a wooden tank located at the northern portion of the Property for treatment prior to being discharged to the washwater impoundment area. Chemical products and process wastes were discharged to the ground surfaces, significantly impacting soil and groundwater. (GLACIER06561, at GLACIER06652) These practices resulted in multiple spills that were reported at the Reichhold facility between 1948 and 1955, including a discharge of 8,000 gallons of formalin and several drums of concentrated ammonia to the LDW in 1948; reports of green-colored discharges from an outfall that prompted an investigation of their washwater impoundment in 1953; a 1953 release of 8,000 gallons of formalin that resulted in a fish kill in the LDW; and a release of phenol in 1955 that was investigated and found to have caused a large fish kill in the LDW, only to then discover another phenol release just two weeks later. (RH_00005707 at RH_00005711-12)

Although it should not be assumed that industrial operators in the 1950s were aware of the impact that these types of releases can have on human health and the environment, Reichhold was a manufacturer of toxic chemicals, which logically would have employed chemists and other scientists that had an above-average understanding of these concepts, especially after learning that releases from their facility had resulted in fish kills and prompted investigations into their source. As such, Reichhold warrants a significant assignment of liability under this factor.

6.2.4 Hanson

Hanson's operations were limited to the transfer of cement and did not involve the use or handling of any significant amount of hazardous substances. (KC2006272; KC2006218) Nevertheless, Hanson took the steps necessary to comply with the discharge criteria established for their process water, stormwater, and air emissions. During an inspection by Ecology in 1972, the cement transfer process was noted by Ecology as being "accomplished with no visible spillage and very little dust." (RH_00000767, at RH_00000777) While minor violations of air permit discharge criteria did occur during Hanson's operations, these types of violations are not uncommon at cement transfer and other industrial facilities, and minor, short-term discharges of this nature are not the source of the COPCs present at the Property. (KC2005468, at KC2005468; KC2004912, at KC2004912; KC2005907, at KC2005907)

Hanson's process water discharges consisted of non-contact cooling water and water from the truck wash station that Hanson installed at the Property to prevent the off-Property tracking of cement and other solids by vehicles. Their discharges were performed in compliance with their regulatory agency-approved permits. (RH_00000767, at RH_00000874; RH_00000767, at RH_00000863) During an inspection by Ecology in 1977, the water being discharged from the facility appeared to be "reasonably clear" and cooling water had been converted from a continuous discharge to a discharge only when operating. (RH_00000767, at RH_00000775) As with the air emissions noted above, the discharges of process and stormwater by Hanson would not have resulted in the impacts that have been confirmed to be present at the Property.

Hanson installed an improved stormwater system on the northern portion of the Property that remains in use today, as well as a stormwater drainage system on the southern portion of the Property that included several catch basins. The stormwater system on the southern portion of the Property has since been decommissioned, but while it was in operation it would have reduced the infiltration of stormwater through contaminated soil, as well as the potential risk of impacts to groundwater. (GLACIER06561, at GLACIER06578) The ERM RI concluded that “The historical stormwater system is considered an insignificant historical transport mechanism” at the Property. (GLACIER06561, at GLACIER06655)

Glacier has argued that Hanson placed material along the eastern shoreline of the Property that had been excavated from contaminated areas of the Property during its redevelopment in 1967-1968. (GLACIER06561, at GLACIER06584-85) Although neither the source of the material placed along the shoreline nor the concentrations of COPCs in that material at the time of placement have been confirmed (as conceded by Glacier’s consultant in their expert report for the LDW allocation process [GNW_00045737, at GNW_00045788]), to the extent that the material that was placed by Hanson may have contained elevated concentrations of COPCs, there is no evidence to suggest that Hanson was aware of the impacts in the material. As such, it is unreasonable to expect that they would have taken steps to prevent the release or spread of COPCs that they did not know they may have been handling. Therefore, Hanson does not warrant the assignment of any liability under this factor.

6.2.5 Glacier

Due to the untimely and late production of documents by Glacier, a thorough evaluation of the degree of care exercised by Glacier to prevent a release or spread of a release could not be completed within the time frame available for this expert report, but no evidence was observed that suggests Glacier’s operations or ownership of the Property contributed to the releases that have impacted the Property.

However, with respect to the degree of care exercised by Glacier in preventing the spread of a release, it is worth noting that the presence of contamination at the Property was identified at the Property in 1985, six years before Glacier purchased the Property in April 1991. (KC2005992, at KC2006012-15) Despite the nearly 30 years that have elapsed since Glacier purchased the Property, they have not yet completed a final report documenting their RI or FS efforts. While the impacts at the Property are complicated, 30 years is an unreasonably long time for a liable party such as Glacier, which owns the Property and is in a position to expedite its investigation and remediation, to complete this process. The contamination in soil remains a secondary source of impacts to groundwater, which has migrated at a reported average flow velocity of 12.7 feet per year, likely causing the distribution of impacts to spread. (GLACIER06561, at GLACIER06597) As such, Glacier warrants an assignment of liability under this factor.

6.3 EQUITABLE FACTOR 3—THE MAGNITUDE AND DURATION OF THE RELEASES CAUSED BY A PARTY

6.3.1 Mineralized Cell

Mineralized Cell’s operations resulted in the intentional, direct discharge of a solution containing arsenic, copper, and zinc to a large area on the southern portion of the Property. What appears to be thousands of pounds of chemicals used to make the arsenical solution can be seen in the 1937 ground-level photo of their operations. (GNW_00027958, at GNW_00027959) A different Mineralized Cell facility that operated on the east side of the LDW reportedly washed and dumped the sludge from their chemical storage tanks twice daily, suggesting that at least 110 gallons of

solution was applied daily, assuming that the storage tank was no smaller than a 55-gallon drum, as it appears in the photo. (GNW_00027958, at GNW_00027959) The actual volume of hazardous substances released at the Property by Mineralized Cell cannot be known, but it is reasonable to conclude that the magnitude of releases from their operation was large, especially when applied across the 3- to 4-year period of their operations. As such, Mineralized Cell warrants a significant assignment of liability under this factor.

6.3.2 Carlisle, Crown Zellerbach, and U.S. Government

The volume of copper ammoniate that was reportedly washed out of a 750-gallon tank and dumped into the LDW or onto the ground of the Property on a monthly basis by Carlisle and Crown Zellerbach and the amount of spent laboratory waste containing arsenic and other COPCs that was discharged to the septic system by CWS on behalf of the U.S. Government cannot be reasonably estimated based on the available information. Similarly, it is not possible to estimate the amount of treated carbon, briquettes, and other contaminated solid waste that was disposed of on the southern portion of the Property. However, considering that the southern portion of the Property was referred to as a “dumping ground” and that solid waste attributable to the charcoal and Whetlerite manufacturing operations has since been discovered at several locations throughout the southern portion the Property, it is reasonable to conclude that the volume of liquid and solid waste improperly disposed of at the Property from the charcoal and Whetlerite plant was large. (GLACIER06561, at GLACIER06582) As such, Carlisle, Crown Zellerbach, and the U.S. Government each warrant an assignment of liability under the magnitude component of this factor.

With respect to the duration of the releases, Carlisle operated the plant for a relatively brief period between August 1942 to February 1943 (7 months), when their contract was transferred to Crown Zellerbach due to Carlisle’s inability to meet production goals. Crown Zellerbach operated the plant from February 1943 to November 1944, a period of 22 months. (GLACIER06561, GLACIER06582) The U.S. Government was reportedly involved in the testing of the Whetlerite throughout the operational periods of both Carlisle and Crown Zellerbach. (GLACIER06561, at GLACIER06582) Therefore, while each of these three entities warrants an assignment of liability under the durational component of this factor, the liability of the U.S. Government, as both owner and operator over the longest period of time, should exceed that of Crown Zellerbach, which should in turn exceed that of Carlisle.

6.3.3 Reichhold

As described in Section 6.2.3, the magnitude of intentional and unintentional releases from the Reichhold chemical plant was greater than the other historical operators that generated and disposed of the COPCs found at the Property. In addition, compared to Mineralized Cell, Carlisle, Crown Zellerbach, and the U.S. Government, Reichhold conducted its operations over a longer period of time; Reichhold operated for a period of 16 years (1946–1961) and none of the other facilities operated at the Property for more than 4 years. (GLACIER06561, at GLACIER06578-80) In light of both the magnitude and duration of its operations, Reichhold warrants the most significant assignment of liability under this factor.

6.3.4 Hanson and Glacier

As previously discussed, Hanson’s and Glacier’s operations are not considered to be a source of COPCs, so they do not warrant an assignment of liability under this factor based on their operations at the Property.

6.4 EQUITABLE FACTOR 4—THE EXTENT OF THE PARTY’S KNOWLEDGE AND AWARENESS OF THE PRESENCE OF CONTAMINATION DURING THEIR PERIOD OF OWNERSHIP/OPERATION

Each of the pre-1964 operators at the Property knowingly and actively discharged hazardous substances to the Property. However, to the extent that they existed, environmental regulations of this era were loosely enforced and the impacts that such releases could have on human health and the environment were not widely understood. That being said, of the pre-1964 operators, Reichhold and the parties that manufactured Whetlerite, especially the U.S. Government, which was responsible for laboratory testing, clearly employed scientists that can reasonably be assumed to have had an above-average understanding of the potential risks associated with releases of the nature, magnitude, and duration that they were causing. For that reason, Reichhold and the U.S. Government warrant the most significant assignment of liability under this factor, followed by Crown Zellerbach and Carlisle. Although Mineralized Cell may also have retained chemists as part of their operation, considering the relatively unsophisticated manner of their operations (treating logs in an open field) relative to those of Reichhold and the Whetlerite manufacturers, which were equipped with laboratories and would have most certainly employed chemists to run them, Mineralized Cell’s assignment of liability for this factor is lower than that of the others.

Hanson, on the other hand, operated a cement transfer facility that utilized very few potential sources of contaminants. They were unaware of any impacts that existed at the Property prior to their operation or ownership of the Property, as pre-acquisition environmental due diligence investigations were uncommon at the time. In addition, unlike petroleum-contaminated soil, which can exhibit a strong, distinct odor when excavated, in my experience, the COPCs that have been detected at elevated concentrations in material placed along the shoreline (PCP, D/Fs, PCBs, metals) do not exhibit a strong odor when encountered in soil, so the construction crew that placed the material may have had no awareness of any impacts that may have been present in the material. The first environmental investigation of the Property that confirmed the presence of contamination at the Property was conducted in 1985, at least 12 years after Hanson purchased the Property and nearly 20 years after they allegedly placed contaminated material along the shoreline. (KC2005992, at KC2006012-15) As such, an assignment of liability to Hanson for this factor is unwarranted.

Due to the fact that Glacier did not provide Hanson with the documents requested in discovery until May 8, 2020, a full week after the deadline for their delivery had passed, it was not possible for me to thoroughly assess whether Glacier performed adequate due diligence prior to their purchase of the Property in 1991. However, assuming that Glacier did perform at least some level of due diligence prior to purchase, as was becoming more common following the passage of CERCLA in 1980 (especially for large industrial properties), then Glacier would have been aware of the initial 1985 environmental investigation that revealed the presence of contamination at the Property. If so, then they willingly entered into the purchase of the Property knowing that, as an owner, they would be liable for the impacts on the Property. Regardless, numerous investigations have been completed since that time and Glacier has had nearly 30 years of ownership to complete an investigation and remediation of the Property. (GLACIER06561, at GLACIER06602-05) Despite the significant amount of time that has passed since they purchased the Property, a final cleanup action plan has not yet been developed, much less implemented, and the contamination present beneath their Property continues to migrate and present unacceptable risks to human health and the environment. As such, Glacier warrants a significant assignment of liability under this factor.

6.5 EQUITABLE FACTOR 5—THE ANTICIPATED RELATIVE COST ASSOCIATED WITH THE INVESTIGATION OF THE SPECIFIC COPCS RELEASED BY THE PARTY

Due to the untimely and late production of documents by Glacier, a thorough review of the draft FS that was prepared by ERM could not be completed in time to provide substantive comments regarding it in this report. However, acknowledging that neither the RI nor the FS has been approved by Ecology under the ongoing Agreed Order process, it would be premature to assume that Ecology will concur with the findings or conclusions of either of these documents. Furthermore, as discussed in the mediation brief submitted on behalf of Hanson, Bankruptcy Code Section 502(e)(1)(B) essentially mandates that a potentially responsible party cannot recover future, unspent costs from a Chapter 11 Debtor and that for this reason, Glacier dropped the portion of its claim that was seeking a share of future costs. Therefore, anticipated future remedial costs are not an appropriate factor for use in the assignment of liability in this case.

The most widespread COPC at the Property is arsenic, which covers approximately 91 percent of the total area of SL exceedances from COPCs at the Property and encompasses virtually all of the areas where copper and zinc impacts are present. Mineralized Cell and the U.S. Government, the latter of which operated the laboratory that used and disposed of arsenic-containing chemicals in the Whetlerite laboratory, are each responsible for the distribution of arsenic, copper, and zinc impacts at the Property. Arsenic is toxic and recalcitrant, which does not make it amenable to the less expensive forms of passive remediation such as monitored natural attenuation. However, the investigation of arsenic impacts can be completed at a cost that is relatively low due to the fact that the laboratory analysis of metals can be performed at a cost of approximately \$50 per metal analyzed in each sample (i.e., a single sample analyzed for only arsenic is \$50; a single sample analyzed for arsenic and copper is \$100, etc.; Appendix C is a quote received from Friedman & Bruya, Inc., a Washington-accredited, Seattle-based laboratory, and includes their standard rates for analyses of selected COPCs capable of achieving the trace detection limits required for the investigation of the Property). Also, for sites such as large industrial properties and orchards, where the impacts are widespread, institutional controls are often used as part of the cleanup action plan at arsenic sites, which may dramatically reduce the cost to eliminate the exposure pathways.

The second most prevalent COPC at the Property is D/Fs, which cover approximately 47 percent of the total area of impacts at the Property, followed by PCP (31 percent) and PCBs (14 percent). Although the distribution of D/Fs impacts is just over half that of arsenic, the cost for an analysis of D/Fs, which ranges from \$510 to \$792 per sample to achieve the detection limits needed for sites being investigated or remediated under an Agreed Order along the LDW, is more than an order of magnitude higher than the cost of arsenic. The costs to analyze a single sample for the presence of PCP or PCBs (using the lowest possible detection limits, as required for sites such as the Property) are approximately \$185 to \$245 and \$135 to \$185, respectively. Although laboratory costs are not the only factor in the cost of an environmental investigation or remediation, they typically constitute a significant percentage of the total project costs. Taking into consideration both the extent of impacts and the cost of laboratory analysis for each of these COPCs, the most significant assignment of liability under this factor should be to Reichhold, which is responsible for most of the D/Fs impacts, all of the PCP impacts, and most of the impacts from PCBs.

Carlisle, Crown Zellerbach, and the U.S. Government are responsible for a relatively small percentage of the D/Fs impacts and may also be responsible for some of the PCB impacts; Mineralized Cell does not share in the liability for impacts from D/Fs or PCBs. The U.S. Government, as the operator of the laboratory that disposed of arsenic in their laboratory's waste streams, is also responsible for approximately 25 percent of the arsenic impacts. Based on this assignment of liability for the distribution of impacts and

accounting for the higher cost to analyze for D/Fs and PCBs, the U.S. Government and Mineralized Cell warrant an equivalent assignment of liability (due to the higher cost of D/Fs that will be carried by the U.S. Government), followed by Crown Zellerbach and then Carlisle.

6.6 EQUITABLE FACTOR 6—THE DISTINGUISHABILITY OF IMPACTS RELATED TO THE PARTY

6.6.1 Metals

COPCs associated with Mineralized Cell's operations include arsenic, copper, and zinc. This same set of COPCs (plus D/Fs) is associated with the operations of the U.S. Government. Carlisle and Crown Zellerbach are not responsible for the arsenic impacts, but are responsible for copper and zinc (and a small percentage of D/Fs). Arsenic concentrations exceeding the SLs have been encountered in soil and/or groundwater throughout most of the Property, covering 91 percent of the total area of impacts from all COPCs and encompassing virtually all the areas of impacts from copper and zinc. Although not clearly distinguishable from releases from the Whetlerite manufacturing process, the distribution of arsenic, copper, and zinc suggests that Mineralized Cell is responsible for approximately 60 percent of the metals impacts at the Property, with the remaining 40 percent split between the U.S. Government (20 percent), Crown Zellerbach (15 percent) and Carlisle (5 percent).

6.6.2 Dioxins/Furans

D/Fs impacts from operations on the Property are attributable to Reichhold and, to a lesser extent, Carlisle, Crown Zellerbach, and the U.S. Government. The combined impacts from these operations, which are distributed across 47 percent of the total area of impacts from all COPCs, are primarily situated in the vicinity of Reichhold's operations, including the washwater impoundment area, the PCP production plant, and the tank farm. Acknowledging the strong correlation between the distribution of D/Fs impacts and the operations of Reichhold, it is most equitable to assign liability for the vast majority of D/Fs impacts to Reichhold.

The Port is entirely responsible for the D/Fs impacts that were encountered on the Property along the narrow strip of land that forms the southern shoreline of Glacier Bay, as the Port was responsible for the placement of this material during construction of T115 and no other known sources of D/Fs to this portion of the Property have been identified. Additional discussion is provided in Section 7.6.

6.6.3 PCP

Reichhold is the only known generator of PCP at the Property, the impacts from which cover approximately 31 percent of the total area of impacts from all COPCs (Figure 10). As such, Reichhold's operations warrant an assignment of full responsibility for these impacts.

6.6.4 PCBs

Based on their years of operation and absence of significant infrastructure, PCB-containing transformers are not likely to have been present during Mineralized Cell's operations. PCB-containing transformers were present during the operational periods of the U.S. Government, Carlisle, Crown Zellerbach, and Reichhold; these transformers were removed prior to the Property redevelopment activities in the mid-1960s. (GLACIER02873, at GLACIER02874-75) Each of the known or suspected PCB-containing transformers was situated in an area of the Property with confirmed PCB impacts (Figure 9). Although isolated areas of PCB impacts are present in areas where transformers were not known to have existed, absent an alternative identifiable source of

PCBs, liability for the PCB impacts at the Property should be assigned to Reichhold, the U.S. Government, Crown Zellerbach, and Carlisle, consistent with their years of operation.

6.6.5 1967–1968 Shoreline Expansion

The assertion by Glacier that Hanson placed contaminated material along the shoreline of the Property during the 1967–1968 shoreline expansion activities has not been proven. Uncertainty remains regarding the volume of material that was placed along the shoreline and the chemical composition of the material at the time it was placed. What is known is that (1) the shoreline expansion activities performed in 1967–1968 resulted in the creation of approximately 15,743 square feet (0.36 acres) of uplands and (2) the material placed in the course of the shoreline expansion activities is currently contaminated by numerous COPCs, including arsenic, D/Fs, PCP, and PCBs (Figures 5 through 10).

While Hanson is clearly not the original source of the contamination that is present along the shoreline or elsewhere at the Property, the available information does not allow for a definitive determination of how these impacts came to exist in the fill material placed along the shoreline in 1967–1968. To the extent that some liability may rest with Hanson for the impacts along the eastern shoreline of the Property, the distinguishability of those impacts may assist in the assignment of that liability.

The combined area of impacts at the uplands portion of the Property totals 561,880 square feet (12.9 acres) and the area of impacted soil within the footprint of the 1967–1968 shoreline totals 15,743 square feet (0.36 acres). Therefore, the land created in 1967–1968, all of which contains one or more COPCs at concentrations above the SL, comprises 2.8 percent of the total area of impacts, which should establish a ceiling for Hanson's liability for impacts at the Property. However, additional factors must be considered that result in Hanson meriting a much smaller percentage of liability, such as the fact that (1) Hanson is not the original source of the contamination that is present along the riverbank; (2) Hanson was not aware that the material may have been contaminated at the time it was placed; (3) the fill used in the shoreline expansion was placed on material that was already contaminated, and (4) there was no net increase in contaminant mass at the Property as a result of Hanson's redevelopment, shoreline expansion, or operational activities.

6.6.6 1970 T115 Expansion

The Port owned the uplands portion of the Property between 1964 and 1973. They leased the Property to Hanson and required Hanson, as part of the lease, to redevelop the Property, which necessitated the demolition of the chemical manufacturing plant that Reichhold had most recently operated. (KC2005739, at KC2005744)

The Port also owns the south-adjacent T115 property, the majority of which was created by the Port in 1969–1970 by the placement of nearly two million cubic yards of material, some of which was sourced from material that was dredged from the LDW. (GLACIER06516, at GLACIER06587; GLACIER06659) The northernmost portion of the T115 expansion project extended onto the easternmost portion of the Property, forming the southern bank of Glacier Bay. The portion of the T115 expansion that extends onto the Property covers an area of approximately 21,321 square feet of land, which constitutes approximately 3.5 percent of the total area of the Property that is impacted by one or more of the COPCs. Several COPCs, including arsenic, copper, zinc, PCBs, and D/Fs, are present in soil within this strip of land, and the Port should be assigned all liability for all

the impacts present in this portion of the Property, as there are no other known sources for the contamination in the material that the Port placed at that location (Figure 10).

7.0 RECOMMENDED ASSIGNMENT OF LIABILITY

The recommended percentage of liability for each of the parties discussed above is as follows:

PARTY	RECOMMENDED PERCENTAGE OF LIABILITY
Mineralized Cell	14
Carlisle	2
Crown Zellerbach	6
U.S. Government	20
Reichhold	50
Port of Seattle	3.5
Hanson	1.5
Glacier	3
TOTAL	100

Below is a summary of the factors that influenced the assignment of liability to the parties involved in the release and spread of contamination throughout the uplands portion of the Property.

7.1 MINERALIZED CELL

Mineralized Cell's wood treatment operations on the southern portion of the Property over the course of 4 years between 1936 and 1939 involved the storage, mixing, application, and release of a solution containing arsenic, copper, and zinc, which are primary COPCs for the Property. (GLACIER06561, at GLACIER06581-82) Consistent with the times in which they operated, Mineralized Cell does not appear to have taken any steps to prevent the release or spread of COPCs used in its operations. In fact, the discharge of waste to the ground via the treatment solution dripping from the exposed ends of logs appears to have been an intended component of its operations. The quantities of materials used in its operations is unknown and the volume of the waste that was released during the storage, mixing, and application processes cannot be estimated, but it can reasonably be assumed that thousands of gallons of the solution were released to the ground surface of the Property over the course of its operations. The distribution of impacts, which shows that the highest concentrations of arsenic, copper, and zinc are present immediately beneath the footprint of Mineralized Cell's treatment area, confirms that its operations resulted in significant contamination to the Property. (GLACIER15394, at GLACIER15430-33; GLACIER15440-43; GLACIER15457-60) These impacts were transported throughout much of the Property by vehicles that tracked contaminated soil across access roads, as well as the movement of freshly treated wood to the loading dock on the eastern shore of the Property and the overland flow of water that contacted the contaminated soil.

One or more of the COPCs used by Mineralized Cell in its operations (primarily arsenic) are present in soil and groundwater across approximately 91 percent of the impacted portions of the Property. However, because arsenic, copper, and zinc were used and released in the testing of Whetlerite in the 1940s, only a portion of the impacts from these COPCs are attributable to Mineralized Cell. Most of the impacts beneath the southern portion of the Property are attributable to Mineralized Cell, but the southern portion of the Property was also used by others as a “dumping ground” for materials that contained these contaminants. (B-DUW-2157514, at B-DUW-2157524-25) There is no evidence to suggest that Mineralized Cell’s operations caused the arsenic impacts in the north-central portion of the Property (where the Whetlerite manufacturing processes were performed), but the drainage ditches, access roads, and the loading dock on the eastern shore provide potential explanations for how impacts from Mineralized Cell could have come to exist in most other areas of the Property. Based on the overall distribution of arsenic, copper, and zinc impacts and accounting for the operations of the Whetlerite manufactures, I attribute approximately 60 percent of the distribution of arsenic, copper, and zinc to Mineralized Cell’s operation. However, Mineralized Cell is not responsible to any significant extent for the release of other COPCs, impacts from which are situated within much of the same footprint as those of arsenic, copper, and zinc. Therefore, Mineralized Cell’s assignment of liability should be much less than 60 percent.

7.2 CARLISLE

Under contract to the U.S. Government, Carlisle constructed the charcoal and Whetlerite manufacturing plant on the northern portion of the Property, which was reportedly completed in 1942 and operated until 1944. (GLACIER06561, at GLACIER06582) It is unknown to what extent the construction of the manufacturing plant would have had on the distribution of the impacts from Mineralized Cell.

Carlisle, Crown Zellerbach, and the U.S. Government each operated at the facility, which resulted in significant impacts from arsenic, copper, and zinc, but also D/Fs, PCBs, and other COPCs. The arsenic impacts associated with the Whetlerite plant were the result of wastes from the laboratory that was run by the U.S. Government, and are not attributed to Carlisle; however, Carlisle is responsible for a portion of the other COPCs, and each should be assigned liability for impacts present beneath the Property.

The most significant impacts associated with Carlisle’s operations are located on the northern portion of the Property, but Carlisle and the other operators of the Whetlerite plant also used the southern portion of the Property as a “dumping ground” for their contaminated solid waste. (B-DUW-2157514, at B-DUW-2157524-25) Their operations resulted in large volumes of liquid wastes being disposed of onto the ground, which then would have migrated along drainage ditches to the Property shoreline and the LDW. Carlisle’s contribution to the impacts at the Property cannot be distinguished from those of Crown Zellerbach, and are only distinguishable from the impacts of the U.S. Government by the fact that Carlisle is not responsible for arsenic contamination; however, Carlisle operated at the Property for only a period of seven months and therefore deserves a relatively small assignment of liability.

7.3 CROWN ZELLERBACH

With the exception of the construction of the Whetlerite plant, Crown Zellerbach’s operations at the Property were the same as those of Carlisle. However, Crown Zellerbach operated at the facility for a period of 22 months, which is roughly three times as long as Carlisle’s operations. (GLACIER06561, at GLACIER06582) As such, Crown Zellerbach warrants an increased assignment of liability relative to Carlisle, in proportion to the duration of their operations.

7.4 U.S. GOVERNMENT

The U.S. Government owned the Property for approximately 22 years between 1943 and 1964, during which time the Property was used as a charcoal and Whetlerite manufacturing plant by CWS (as agent for the U.S. Government), Carlisle, and Crown Zellerbach, and as a chemical manufacturing plant by Reichhold. Their agents contracted with Carlisle to construct the charcoal and Whetlerite manufacturing plant, and they contracted and worked with both Carlisle and Crown Zellerbach throughout the facility's entire period of operations from 1942 to 1944. (GLACIER06561, at GLACIER06582)

Unlike Carlisle and Crown Zellerbach, the U.S. Government's agents also operated the Whetlerite plant's laboratory. (GLACIER06561, at GLACIER06582) One of the functions of the laboratory was to test the Whetlerite in order to confirm that the gas masks in which it was to be used were able to protect the person wearing it from exposure to toxic chemicals, such as arsenic. (GLACIER06561, at GLACIER06582) Therefore, the U.S. Government's agents were clearly aware of the adverse impacts that toxic chemicals such as those being produced and disposed of at the Property had on human health. Despite this, the laboratory knowingly disposed of liquid and solid wastes containing arsenic and other COPCs throughout the Property, including directly to the septic system on the northeastern portion of the Property and in the "dumping grounds" on the southern portion of the Property. (B-DUW-2157514, at B-DUW-2157524-25) Considering the widespread distribution of arsenic in soil and groundwater at the Property, the presence of arsenic in the wastes produced by the laboratory is significant. Also significant is the fact that the work being done by both Carlisle and Crown Zellerbach was performed on behalf and for the benefit of the U.S. Government, which owned the Property throughout the plant's period of operations. (GLACIER06561, at GLACIER06582) The U.S. Government warrants an assignment of liability that accounts for their period of ownership and operation at the Whetlerite plant, as well as their ownership of the Property during Reichhold's operations.

7.5 REICHHOLD

Reichhold leased the Property from the U.S. Government for approximately 16 years between 1946 and 1961. (GLACIER06561, at GLACIER06583) After renovating the former Whetlerite plant and constructing a number of other improvements on the northern portion of the Property, in 1947 Reichhold began producing resins, glues, and chemicals, such as PCP and sodium pentachlorophenate. Although PCP, of which D/Fs are a known by-product, was only reportedly manufactured between 1953 and 1956, Reichhold's chemical production activities continued at the Property until 1961. (GLACIER06561, at GLACIER06583) During that entire period, the facility operated PCB-containing transformers in several locations, which resulted in PCB impacts in soil at each known transformer location. (GLACIER02873, at GLACIER02874-75)

Reichhold discharged untold quantities of contaminated waste to the drainage ditches on the Property and directly into the LDW, despite being a chemical manufacturing company that was undoubtedly familiar with the toxicity of the chemicals that it was discharging. (GLACIER06561, at GLACIER06584) Several of these discharges were so severe that they resulted in large fish kills in the LDW. (RH_00005707, at RH_00005711-12) Reichhold also constructed an unlined impoundment area immediately adjacent to the shoreline of the Property, which allowed the contaminated water that was stored in it to infiltrate and resulted in significant impacts to soil and groundwater along the shoreline by a number of COPCs, including PCP, D/Fs, and PCBs, which are highly toxic. (GLACIER06561, at GLACIER06583-84; GLACIER06652)

Reichhold is the only party that handled and disposed of PCP and is mostly responsible for the D/Fs that are present in the subsurface. (GLACIER06561, at GLACIER06652) Acknowledging the distinguishability and toxicity of the wastes that Reichhold released at the Property, as well as the volume of those discharges, which occurred over a period of time that was nearly four times longer than any of the other operators that preceded it at the Property, Reichhold warrants an assignment of liability that is significantly larger than any other party. (GLACIER06561, at GLACIER06583-84)

7.6 PORT OF SEATTLE

The Port owned the uplands portion of the Property between 1964 and 1973. The Port leased the Property to Hanson and required Hanson, as part of the lease, to redevelop the Property, which necessitated the demolition of the chemical manufacturing plant that Reichhold had most recently operated. (KC2005739, at KC2005744)

The Port also owns the south-adjacent T115 property, the majority of which was created by the Port in 1969–1970 by the placement of nearly 2 million cubic yards of material, some of which was sourced from material that was dredged from the contaminated waters of the LDW. (GLACIER06561, at GLACIER06587; GLACIER06659) The northernmost portion of the T115 expansion project extended onto the easternmost portion of the Property, forming the southern bank of Glacier Bay. The portion of the T115 expansion that extends onto the Property covers an area of approximately 21,321 square feet of land, which constitutes approximately 3.5 percent of the total area of the Property that is impacted by one or more of the COPCs. Several COPCs, including arsenic, copper, zinc, PCBs, and D/Fs, are present in soil within this strip of land, and the Port should be assigned all liability for all the impacts present in this portion of the Property, as there are no other known sources for the contamination in the material that the Port placed at that location. (GLACIER06561, at GLACIER06659-60)

7.7 HANSON

Hanson originally leased the Property from the Port in 1964 and purchased it from the Port in 1973. (GLACIER06561, at GLACIER06579) Hanson owned the Property until 1987, when they sold it to LSI. (GLACIER06561, at GLACIER06585-06586) In accordance with the terms of its lease with the Port, Hanson demolished the structures and associated equipment that had been used most recently by Reichhold and constructed most of the existing components of the cement terminal, which Hanson only used to store and transfer cement. Cement was not manufactured at the Property, and there is no reason to suspect, nor have assertions been made, that Hanson's operation of the cement terminal contributed to the impacts present at the Property. (GLACIER06561, at GLACIER06576; KC2006272; KC2006218)

The stormwater system that Hanson reportedly installed on the southern portion of the Property would have served to reduce the infiltration of precipitation through contaminated soil and thereby reduce the potential for additional groundwater contamination while it was in operation, which reportedly ceased some time before 1991. (GLACIER06561, at GLACIER06585-86) It is not surprising that solids collected from inside the former stormwater pipe contained elevated concentrations of some COPCs; such contamination is present in near-surface soil throughout much of the area that drained into the stormwater system, and some of that contaminated soil would have been entrained in the stormwater runoff. During the 2014 investigation of the former stormwater system, there were no observations of a breach that would have allowed for the contaminated water that passed through the system to contaminate otherwise unimpacted areas of the Property, and ERM concluded that the system was an "insignificant historical transport mechanism" for contamination. (GLACIER06561, at GLACIER06655)

Glacier also asserts that Hanson is liable for impacts at the Property because Hanson allegedly placed contaminated material along the shoreline during the 1967–1968 shoreline expansion activities. However, neither Glacier nor Hanson has sufficient evidence to prove that the material along the shoreline was contaminated or uncontaminated at the time of its placement.

If one assumes that the material was contaminated before it was placed along the shoreline, several factors must be considered with assigning liability for its placement, including:

1. Hanson did not cause the contamination to be present in the material that was placed along the shoreline. The contamination was caused by the numerous and significant releases of prior operators such as Mineralized Cell, the operators of the Whetlerite plant, and Reichhold.
2. Hanson was unaware of the contamination. There were no environmental investigations of the Property performed prior to the shoreline expansion that would have alerted Hanson to the contamination, and the types of contaminants that are currently present within the area of shoreline expansion may not have exhibited odors or discoloration, such as is often observed in petroleum-contaminated sites. Furthermore, it is not apparent that the construction workers that performed the shoreline expansion had any experience working at contaminated sites, or that they would have recognized any indications of contamination, if present.
3. The materials used for the shoreline expansion were placed on and adjacent to similarly impacted material, especially in the vicinity of the former wastewater impoundment area. (GLACIER15394, at GLACIER15433-39) Considering the extensive groundwater contamination immediately west of the shoreline expansion area, if it were to somehow be proven that the material placed along the shoreline was not contaminated at the time of its placement, the material would have become contaminated by the groundwater contamination that flowed through it.
4. Contaminated material is not alleged to have been imported to the Property by Hanson, so the volume and mass of contamination at the Property did not increase as a result of the shoreline expansion, except to the extent that clean material that may have been placed by Hanson would now be contaminated by the flow of contaminated groundwater through it.
5. If the material along the shoreline was contaminated at the time it was placed, the method and cost of remediation would not be significantly increased. Soil located to the west of the area of shoreline expansion, which was in place before the shoreline expansion activities occurred, is contaminated with many of the same COPCs that were detected in soil collected from within the area of expansion. (GLACIER15394, at GLACIER15433-39) If, hypothetically, the shoreline expansion had not been performed at all and the current shoreline was situated where the 1963 shoreline is depicted in the ERM RI, there would still be impacts requiring remediation located along that shoreline. Therefore, any remedial approach would still have to account for the proximity of those impacts to the surface water of the LDW.

In light of the fact that (1) the volume, mass, and magnitude of the contamination at the Property have not increased as a result of any of Hanson's activities, including the shoreline expansion activities that at worst moved the contamination from one location to another, and (2) the remedial approach, which has not yet been established despite the nearly 30 years that Glacier has owned the Property, (GLACIER06561, at GLACIER06579-80) would have required the same level of shoreline permitting and protection measures regardless of whether the shoreline was in its current or previous configuration, the most appropriate method of estimating the impact that the shoreline expansion has had on the cost of the

remedial investigation work performed to date is to calculate what percentage of the remedial investigation costs are attributable to the shoreline expansion area. Because the level of detail provided in the invoices and other documentation provided by Glacier does not allow for such a determination, instead, the square footage of the shoreline expansion area was compared to the total area of impacts at the Property, which indicates that the area of impacts at the Property was increased by approximately 2.8 percent.

However, Hanson does not warrant a 2.8 percent assignment of liability of the total costs incurred to date for several reasons:

1. Remedial investigation costs to date include those associated with interim actions that were performed outside the area of shoreline expansion. (GLACIER06561, at GLACIER06608) The cost of those interim actions should not be included in the total against which Hanson's assigned percentage is calculated.
2. Increases in costs associated with investigating the upland shoreline expansion area were offset by the decreases in costs associated with no longer having to investigate that area as part of the sediment investigation.
3. As previously stated, Hanson did not cause the contamination to exist, so any increase in remedial investigation costs should be shared with those that did.

7.8 GLACIER

Glacier purchased the Property in 1991, more than 10 years after the passage of CERCLA at a time when performing due diligence of properties, especially large industrial one, had become commonplace. (GLACIER06561, at GLACIER06579-80) As such, they should have been aware that the Property they were purchasing was contaminated, since that discovery had been made in 1985, 6 years before their purchase. By purchasing the Property, they also acquired the liabilities associated with that purchase.

Despite the nearly 30 years that have passed since Glacier acquired the Property, the report documenting their RI and FS efforts remains in draft form, with the feasibility study component of that report having been submitted for regulatory review less than one month ago. (GLACIER06561, at GLACIER06579-80) In the time that they have owned the Property, contaminated groundwater has migrated, expanding the footprint of contamination, including into the water of the LDW. Although Glacier's operation of the cement terminal, like Hanson's, has not resulted in the contribution of any significant impacts to the Property, their failure to complete an RI within a reasonable time frame warrants them an assignment of a small percentage of the liability.

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May 2020

Expert Report

Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

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Prepared at the request of legal counsel for
mediation and in anticipation of litigation





DRAFT

Evaluation of Liability for Past Investigation and Remediation Costs

Glacier Northwest Property

May 2020

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2020.0548

PRIVILEGED AND CONFIDENTIAL

Prepared at the request of legal counsel
for mediation and in anticipation of
litigation

This expert report was prepared by a team
under the direction of the senior technical
expert designated above. Only that
individual is designated for addressing
questions of any kind related to the
opinions expressed herein.

Abstract

Veris Law Group PLLC and Hillis Clark Martin & Peterson P.S. (counsel), on behalf of Glacier Northwest, Inc. (Glacier Northwest), retained TIG Environmental (TIG) to evaluate how to fairly distribute the costs of past investigations and remediations performed at the property located at 5900 West Marginal Way in Seattle, Washington (Property). Glacier Northwest is the current owner and operator of the Property. Kaiser Cement and Gypsum Corporation and Kaiser Cement Corporation, two corporate predecessors to Hanson Permanente Cement, Inc. (Hanson), formerly owned and operated the Property. In 2017, Glacier Northwest filed a proof of claim against Hanson seeking to recover costs incurred by Glacier Northwest and Reichhold Chemicals, Inc. (Reichhold), a former operator of the Property, to investigate and remediate the Property.

To conduct this evaluation, TIG reviewed information provided by counsel to answer the following questions:

- Which parties and their operations are responsible for the contamination at the Property?
- What are the contamination sources with respect to area, environmental media type, and/or contaminant?
- Can the completed investigations and remediations can be linked to an operational area, environmental media type, and/or contaminant?
- Can the cost of the completed investigations and remediations be distributed between the historical owners and operators of the Property? If so, how?
- Were the completed investigation and remediations performed in compliance with the Model Toxics Control Act (MTCA) and the National Oil and Hazardous Substances Pollution Contingency Plan, also known as National Contingency Plan (NCP), as well as the requirements of the Agreed Order (AO) between Glacier Northwest, Reichhold, and the Washington State Department of Ecology (Ecology)?

TIG evaluated the Remedial Investigation/Feasibility Study prepared in 2020 by ERM to determine the contaminants associated with the succession of operators at the Property. The Property has been continuously operated for industrial purposes since 1936. These operations include wood treatment, manufacturing and testing of activated charcoal and whetlerite, manufacturing of chemicals such as resins, glues, formaldehyde, pentachlorophenol (PCP), and cement storage and distribution. The Property has been operated as a cement storage and distribution terminal since 1969. Contaminants of concern (COCs) identified by ERM present in soil, groundwater, and stormwater at the Property include arsenic, copper, zinc, PCP, polychlorinated biphenyls (PCBs), carcinogenic polyaromatic hydrocarbons (cPAHs), dioxins and furans, total petroleum hydrocarbons (TPH), and tributyltin (TBT).

Multiple investigations and remediations have occurred at the Property since 1985, including a series of investigations and remediations performed as independent actions through 2007. Since 2009, investigations have been performed under the AO. TIG evaluated a set of consultant, regulatory agency, and attorney invoices pertaining to these past investigations and remediations to determine total costs incurred. The total costs of completed investigations and remediations amounts to \$8,604,890.98. These costs have been incurred or paid by Glacier Northwest or Reichhold. In 2014, Reichhold commenced a Chapter 11

bankruptcy case. In that case, Glacier Northwest filed a contribution and cost-recovery claim similar to the claim made in Hanson's bankruptcy. In settlement of Glacier Northwest's claim in the Reichhold bankruptcy, Reichhold assigned to Glacier Northwest the right to recover from third parties the costs that Reichhold incurred to investigate and remediate the Property. Glacier Northwest's claim in the Hanson bankruptcy includes the costs that Glacier Northwest has incurred directly as well as the costs incurred by Reichhold.

The invoices provided insufficient detail to attribute the cost of each completed investigation or remediation to a specific operator or contaminant, or the work reflected in the invoices pertained to multiple sources of contamination, not discrete sources of contamination. As a result, a simple assignment of cost per investigation or remediation to a specific operational area, environmental media type, and/or COC was not feasible. Therefore, TIG developed an algorithm to allocate the costs of the completed investigations and remediations amongst all former owners and operators of the Property. TIG then re-assigned to Glacier Northwest, Reichhold, and Hanson the costs initially allocated to other owners and operators.

TIG's algorithm assigned a weight to each COC-based on frequency of detection above screening levels in environmental media at the upland portion of the Property and a weight to each former and current owner and operator of the Property based on duration and size of operational area. Using these two factors, TIG assigned percentages of the total cost to each owner or operator depending on which COC each owner and operator is associated with. Once the shares of the total cost were allocated amongst all current and former owners and operators of the Property, TIG added an exacerbation factor to Hanson's share otherwise attributable to the owners and operators that predated Hanson to account for the fact that Hanson knowingly dispersed existing contamination on the Property by redevelopment activities. TIG then redistributed those costs between Glacier Northwest, Reichhold, and Hanson. This resulted in a total cost share for Glacier Northwest of 3.52 percent, a total cost share for Reichhold of 58.94 percent, and a total cost share for Hanson of 37.54 percent. Applying these percentages to the costs of the completed investigations and remediations, Glacier Northwest would be assigned \$302,771.79 of the costs, Reichhold would be assigned \$5,071,521.86 of the costs, and Hanson would be assigned \$3,230,597.33 of the costs.

Table of Contents

1. Introduction	3
2. Background	3
3. Methodology	4
4. Property History	5
4.1 Historical Owners	6
4.2 Historical Operators and Operations	6
4.2.1 Mineralized-Cell Wood Preserving Co.	6
4.2.2 Carlisle Lumber Company, Crown Zellerbach, and U.S. Army.....	8
4.2.3 Reichhold	9
4.2.4 Hanson Permanente Cement, Inc.	11
4.2.5 Ash Grove Cement Company.....	12
4.2.6 Glacier Northwest	13
4.2.7 Off-Property Sources	13
4.2.8 Historical Operations Summary	14
4.3 Previous Investigation and Remediation Activities.....	15
4.3.1 RETEC RI (1996).....	15
4.3.2 Fluor Daniel GTI Pre-Remedial Action Characterization (1998)	15
4.3.3 Fluor Daniel GTI Treatability Studies for PCP and Arsenic in Groundwater (1998).....	16
4.3.4 IT Corporation Hydrogen Peroxide Fixation, Arsenic in Groundwater Remediation (2000).....	16
4.3.5 Ozone Sparging System to Remediate PCP in Groundwater (2000).....	16
4.3.6 Shaw Arsenic Investigations (2003)	16
4.3.7 Shaw Groundwater Sampling for PCP (2004-2007)	16
4.3.8 ERM Upland and Riverbank Soil and Groundwater Investigations (2009–2019)	16
5. Compliance with MTCA, the AO and NCP	17
6. Allocation of Glacier Northwest and Reichhold Costs	19
6.1 Costs Incurred at the Property	19

6.2	Allocation of Costs	20
6.2.1	Step 1: Derive the Relative Weight of Property COCs.....	20
6.2.2	Step 2: Derive the Relative Contributions of Each Property COC by Each Operator	21
6.2.3	Step 3: Multiply the Results of Steps 1 and 2 to Derive the Percent of the Costs Attributable to Each Operational Period for each COC:.....	22
6.2.4	Step 4: Assign Responsibility to Property Owners during Operating Periods	23
6.2.5	Step 5: Assign a Liability Share to Each Owner and Operator	24
6.2.7	Step 7: Reallocate Liability Shares between Participating Parties	25
7.	Summary and Conclusions	26
8.	References	28

Tables

- 1 Relative Weights of Property COCs
- 2 Relative Contributions of Each Property COC During Each Operational Period
- 3 Percent of the Total Past Cost Attributable to Each Operational Period
- 4 Proportions of Total Cost Attributable to Owners and Operators
- 5 Share of Total Costs Assigned to Each Party
- 6 Account for Exacerbation of Existing Contamination and Reallocate Costs between Remaining Liable Parties

Figures

- 1 Property Location
- 2 Methodology Flow Chart
- 3 Historical Operational Areas
- 4 Timeline of Owners, Operators, and Operations
- 5 Cost Algorithm Conceptual Model

Appendices

- A Compilation of Documents Reviewed by TIG
- B Summary of Costs
- C Qualifications of Expert

1. Introduction

Veris Law Group PLLC and Hillis Clark Martin & Peterson P.S. (counsel), on behalf of Glacier Northwest, Inc. (Glacier Northwest), retained TIG Environmental (TIG)¹ to evaluate how to fairly distribute the costs of investigations and remediations performed at the property located at 5900 West Marginal Way in Seattle, Washington (Property). The Property abuts the western shoreline of the Lower Duwamish Waterway (LDW) Superfund Site (Figure 1). Glacier Northwest is the current owner and operator of the Property. Kaiser Cement and Gypsum Corporation and Kaiser Cement Corporation, two corporate predecessors to Hanson Permanente Cement, Inc. (Hanson), formerly owned and operated the Property.

TIG was directed to exclude from its evaluation the potential contribution of contamination from the Property to adjacent sediments in the LDW Superfund Site, and the estimated cost of future remedial actions at the Property.

2. Background

The Property encompasses 13.7 acres of uplands and 4.2 acres of aquatic/submerged land that forms an embayment with the LDW (Figure 1). The LDW borders the Property to the east. The Property is bordered to the north by property operated by Alaska Marine Lines, Inc. (AML) and owned by Duwamish Shipyard, Inc., to the west by West Marginal Way, and to the south by the Port of Seattle (Port)-owned Terminal 115 (T-115) (Figure 3). Since acquiring the Property in 1991, Glacier Northwest has operated a cement distribution and storage terminal at the Property.

In 1995, Glacier Northwest and Reichhold Chemicals, Inc. (Reichhold), which operated a chemical manufacturing plant at the Property from 1946 to 1961, entered a settlement agreement pursuant to which they agreed to share in the costs of investigating and cleaning up the contamination at the Property (*Glacier Northwest, Inc. v Kaiser Gypsum Company, Inc., et al.* 2020, 4–5). In 2009, the Washington State Department of Ecology (Ecology) entered into an Agreed Order (AO)² with Glacier Northwest and Reichhold as potentially liable persons (PLPs) to investigate contamination at the Property (Ecology 2009). In 2014, Reichhold declared bankruptcy and rejected the 1995 settlement agreement. In settlement of the claim Glacier Northwest filed against Reichhold in the bankruptcy, Reichhold assigned to Glacier Northwest the right to recover Reichhold's investigation and remediation costs from third parties (*Glacier Northwest, Inc. v Kaiser Gypsum Company, Inc., et al.* 2020, 5; Glacier Northwest 2015). After Reichhold's bankruptcy, Glacier Northwest was left alone to comply with the AO.

In 2016, Hanson commenced a Chapter 11 bankruptcy case. In 2017, Glacier Northwest filed a proof of claim in the bankruptcy case seeking recovery of the costs incurred by Glacier Northwest and Reichhold in

¹ TIG Environmental is a member of The Intelligence Group, LLC.

² Ecology Agreed Order No. DE 6000 in the Matter of Remedial Action by: Glacier Northwest, Inc. and Reichhold, Inc.

response to the contamination at the Property (*Glacier Northwest, Inc. v Kaiser Gypsum Company, Inc., et al.* 2020, 4).

To conduct this evaluation, TIG reviewed information provided by counsel to answer the following questions:

- Which parties and their operations are responsible for the contamination at the Property?
- What are the contamination sources with respect to area, environmental media type, and/or contaminant?
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- Can the cost of the completed investigations and remediations be distributed between the historical owners and operators of the Property? If so, how?
- Were the completed investigation and remediations performed in compliance with the Model Toxics Control Act (MTCA) and the National Oil and Hazardous Substances Pollution Contingency Plan, also known as National Contingency Plan (NCP), as well as the requirements of the AO between Glacier Northwest, Reichhold, and Ecology?

TIG solely relied on the documents provided for review by counsel (Appendix B). Data and information obtained from the reports is considered true and accurate. TIG deviated from the provided data only if its professional experience, subject matter knowledge, and/or professional judgement suggested otherwise.

3. Methodology

TIG applied the methodology described below when reviewing and evaluating the provided data to provide a fair and accurate cost allocation (Figure 2). To understand the operational history, current conditions, completed investigations and remediations, and the nature and extent of contamination, TIG reviewed the 2020 Remedial Investigation Report (RI) prepared by Environmental Resource Management, Inc. (ERM) for Glacier Northwest (ERM 2020a) and its appendices, historical aerial photographs for the Property and vicinity, the AO, the 2012 RI/FS Work Plan and its 2013 Addendum, prepared by ERM for Glacier Northwest.³ Through a review of historical plans, TIG divided the Property into generalized operational areas and identified localized areas of contamination with source areas. TIG used these operational areas to quantify the distribution of contaminants resulting from Property modifications and redevelopment. In addition, TIG evaluated whether Property redevelopment affected past investigation or remediation costs.

To evaluate the costs incurred by Glacier Northwest and Reichhold for investigations and remediation of contamination at the Property, TIG reviewed 536 invoices and calculated the total cost for past investigation

³ TIG also reviewed the Draft Feasibility Study (FS) Report by ERM (ERM 2020b); however, the findings of the FS did not alter TIG's evaluation and opinions.

and remediation activities. Total past cost⁴ was based on consultant, attorney, and regulatory agency invoices that TIG confirmed against investigations and remedial action activities discussed in 2020 Draft RI report.

TIG reviewed chemistry data and historical operations to assess whether the distribution of contaminants could be linked to an operational area associated with a known historical operator. Overlapping operational areas, contaminants associated with more than one party, distribution of waste by several parties in areas beyond operational areas, and redevelopment activities that moved contaminants from source areas did not allow TIG to assign contamination to one or other historical source. In addition, the reviewed invoices provided limited detail for cost distribution purposes. A simple distribution of cost based on the origin of the contaminants was not appropriate given the available data. All remaining costs were included in calculations of an algorithm with several standard metrics for estimating liability shares in environmental cost recovery and/or allocations.

The algorithm apportions the past investigation and remediation costs among all current and former owners and operators of the Property according to a defined set of metrics. These metrics include scores for the origin of contaminants of concern (COCs), duration of operations, operational area on the Property, and an exacerbation factor applicable to parties that performed redevelopment and moved contaminants from source areas to other areas of the Property. The algorithm calculated a share of the total past cost for each party based on the input metrics. Once the shares of the total cost were allocated amongst all current and former owners and operators of the Property, TIG redistributed those costs between Glacier Northwest, Reichhold, and Hanson.

TIG also evaluated whether the investigations and remediations performed to date were performed in compliance with MTCA, the AO, and the NCP.

4. Property History

This section summarizes the operations conducted by each owner and/or operator of the Property that resulted in contamination of environmental media or movement of previously contaminated media.

⁴ The total past investigation and remediation cost does not include sediment investigations related to the LDW Superfund Site, consultant fees related to the LDW Superfund Site, or attorneys' fees related to the LDW Superfund Site. The total past investigation and remediation cost includes Ecology fees, consultant fees incurred by Glacier Northwest and Reichhold, as well as attorneys' fees incurred by Glacier Northwest and Reichhold.

4.1 Historical Owners

Ownership history for the Property is known from approximately 1918, as detailed below (Figure 4) (ERM 2020a, 20–22):

- **At least 1911 to 1973:** The Port⁵ owned the embayment of the Property. Prior to 1922, the Port filled the upland portion of the Property with dredge material from the LDW, and the U.S. Army Corps of Engineers constructed a wooden bulkhead (ERM 2020a, 20).
- **1918 to 1924:** Puget Sound Bridge & Dredging Company owned a portion of the Property (ERM 2020a, 21).
- **1924 to 1927:** Individuals and the General Investment Company owned a portion of the Property; its operations are unknown.
- **1927 to 1943:** King County owned a portion of the Property (ERM 2020a, 21).
- **1943:** Carlisle Lumber Company (Carlisle) owned a portion of the Property for approximately 120 days.
- **1943 to 1964:** The U.S. government owned the upland portion of the Property.
- **1964 to 1969:** The Port owned the entirety of the Property, including the embayment (ERM 2020a, 21).
- **1969 to 1987:** Hanson owned the entirety of the Property, including the embayment (ERM 2020a, 21).
- **1987 to 1991:** Lone Star Industries, Inc. and Lone Star Northwest GP owned the entirety of the Property, including the embayment (ERM 2020a, 22).
- **1991 to Present:** Glacier Northwest has owned the entirety of the Property, including the embayment (ERM 2020a, 22).

4.2 Historical Operators and Operations

This section describes the activities conducted at the Property by the main historical operators, including Mineralized-Cell Wood Preserving Co. (Mineralized-Cell), Carlisle, Crown Zellerbach Co. (Crown), the U.S. Army, Reichhold, Hanson, and Glacier Northwest. This section assesses the relationship between each COC identified by ERM in the 2020 RI that requires cleanup at the Property and the operators or operations associated with these COCs.

4.2.1 Mineralized-Cell Wood Preserving Co.

From approximately 1936 to 1939, Mineralized-Cell operated a wood preservation and treatment facility on the southern portion of the Property (Figure 3) (ERM 2020a, 23). The wood preservation and treatment facility included two structures in the center of its operational area: a building for storage of chemicals used

⁵ In the 2020 RI, ERM states that the Port owned the site embayment; however, based on publicly available information, the Commercial Waterway District (CWD) was the predecessor of the Port and owned submerged lands within the LDW until at least 1957 (*Commercial Waterway District No. 1 of King County v The State of Washington* 1957).

during the wood preservation process and a building that was most likely a boiler house. Mineralized-Cell operated a dock along the property shoreline to the LDW for receiving log shipments (ERM 2020a, 23). Mineralized-Cell unloaded the logs from the dock and placed them in a line perpendicular to the southern boundary of the Property for treatment (ERM 2020a, 23). After unloading, Mineralized-Cell pressure-treated logs by applying a solution containing arsenic, copper sulfate, zinc sulfate, and at least eight other unknown chemicals to either end of the log until the solution dripped from the log's exposed ends (ERM 2020a, 23). Treatment chemicals were stored in tanks that were washed out daily, according to a 1945 pollution control report indicating that any residual chemicals within these tanks were washed onto the ground surface (ERM 2020a, 23). After treatment, treated logs were shipped by either truck or from the dock on the LDW.

Legacy Contaminants Associated with Wood Preservation and Treatment Operations

Mineralized-Cell's wood treatment and preserving operations were associated with arsenic, copper, and zinc (ERM 2020a, 63–64, 91). The wood treatment performed on the Property's unpaved ground surface was a likely source of contaminated soil and groundwater in the wood preservation and treatment areas of the Property (ERM 2020b, 91). Elevated concentrations of arsenic, copper, and zinc are present in soil and groundwater within and near Mineralized-Cell's former operational area. According to ERM, some of the detections of arsenic along the riverbank are likely a result of staging of treated wood near the former dock to prepare for shipment of logs from the dock on the LDW (ERM 2020b, 91). TIG agrees with this conclusion.

Unlined drainage ditches were reportedly present during Mineralized-Cell's operational period, according to ERM (ERM 2020a, 20). ERM was unable to confirm whether Mineralized-Cell used these ditches to transport wastewater and stormwater from process areas into the embayment (ERM 2020c, 20, 23–24). Mineralized-Cell treated logs by applying a solution containing arsenic, copper, and zinc to either ends of a freshly cut log, allowing the treatment chemical to drip onto the pervious ground surface below the log (ERM 2020a, 23). This process allowed the treatment chemicals containing COCs to contaminate the underlying soils and their distribution by sheet flow or unchanneled stormwater throughout the southern half of the Property, beyond the operational footprint of Mineralized-Cell (ERM 2020a, 23–24).

The highest concentrations of arsenic and copper in saturated soil, unsaturated soil, shallow groundwater, and deep groundwater are present in the location of the former wood treatment facility (ERM 2020c, 37–39, 47–50). Although areas with the highest concentrations of arsenic, copper, and zinc are located in this portion of the Property, arsenic and copper were generally detected across the Property in all environmental media types at concentrations above applicable screening level values, including in riverbank soil (ERM 2020c, 37–39, 47–50). Zinc is also present throughout the Property in soils and in groundwater in a few isolated areas throughout the Property (ERM 2020a, 64).

The wide distribution of arsenic and copper throughout the Property indicates that the current extent of contamination cannot be solely associated with Mineralized-Cell historical operations (ERM 2020c, 37–39, 47–50). Other potential sources of arsenic and copper are discussed in the following sections. According to ERM, the distribution throughout the Property beyond source areas was likely caused by redevelopment activities that moved contaminants in soil from their source area to other areas of the Property.

4.2.2 Carlisle Lumber Company, Crown Zellerbach, and U.S. Army

Between 1940 and 1943, pursuant to an educational contract awarded by the U.S. Chemical Warfare Service (CWS),⁶ Carlisle constructed a charcoal and whetlerite⁷ manufacturing plant on the northern half of the Property, parallel with the northern boundary of the Property (Figure 3) (ERM 2020a, 24). The manufacturing plant consisted of at least nine buildings, including a main manufacturing plant and ancillary support structures (such as chemical and other storage areas, laboratories, underground storage tanks [USTs], and a rail spur). According to ERM, an unlined drainage ditch present along the southern Property boundary was likely used for stormwater and wastewater conveyance (ERM 2020c, 11, 24). In 1943, the U.S. Army purchased the production plant from Carlisle and contracted Crown to continue production of activated charcoal and whetlerite (ERM 2020a, 24). During the plant's operational period from 1941–1944, Carlisle and Crown produced a cumulative total of 5.2 million pounds (lbs) of activated charcoal and 2.6 million lbs of whetlerite (ERM 2020a, 24). For the purposes of this report, Carlisle, Crown, and the U.S. Army are considered one operator because they all operated the same charcoal and whetlerite manufacturing and testing facility.

In addition to manufacturing, the U.S. Army operated a testing facility for the finished product at the Property, using chemicals such as arsine, chloropicrin, cyanogen chloride, and phosgene.⁸ The U.S. Army either dumped or incinerated spent carbon remaining from the testing process on the Property, though the specific location where incineration and/or dumping of spent testing materials occurred is unknown (ERM 2020a, 24). These operations ceased in 1944.

Legacy Contaminants Associated with Manufacturing and Testing of Activated Charcoal and Whetlerite

Operations of the charcoal and whetlerite manufacturing and testing facility are associated with copper, arsenic, zinc, dioxins/furans, carcinogenic polycyclic aromatic hydrocarbons (cPAHs),⁹ and diesel-range and motor oil-range total petroleum hydrocarbon (TPH) (ERM 2020a, 93). Carlisle, Crown, and the U.S. Army stored the copper ammoniate, which was used during the manufacturing process, in a 750-gallon tank that was cleaned out monthly. The resulting waste from cleaning this tank were initially dumped into the embayment and, during later operations, onto an adjacent field (ERM 2020a, 24, 92). Since the finished charcoal and whetlerite was intended for use in gas masks, testing was performed by exposure to various chemicals, including arsine, chloropicrin, cyanogen chloride, phosgene, arsenous acid, magnesium arsenite,

⁶ CWS is a branch of the U.S. Army formed in 1918 to consolidate research and development of chemical weapons (Brophy, Miles, and Cochrane 1959, 34). CWS awarded educational contracts as a part of its Educational Order Program, which, beginning in 1938, distributed funding to manufacturers to produce items that the government deemed essential for warfare, including gas masks (Brophy, Miles, and Cochrane 1959, 242).

⁷ Whetlerite is activated carbon impregnated with copper, hexavalent chromium, and silver. It was historically used for air filtration inside of gas masks (Blacet and Grabenstetter 1943, 1–2).

⁸ Arsine, chloropicrin, cyanogen chloride, and phosgene are compounds used in chemical weapons that were part of the U.S. Military inventory of weapons during World Wars I and II (Coleman 2005, 11, 17–19).

⁹ ERM identified individual cPAHs as primary contaminants in soil, however these individual cPAHs were co-located with the soil samples exceeding the toxicity equivalent quotient (TEQ) of total cPAHs. Therefore, the magnitude and extent of individual cPAHs can be represented by the total cPAHs.

magnesium arsenide, an unspecified zinc metal analyte reagent, and zinc metal (ERM 2020a, 93). Once testing was completed, the spent carbon and whetlerite was either incinerated on the Property or dumped onto the ground surface, allowing the chemicals to remain in soils and eventually migrate to groundwater (ERM 2020a, 93).

The chemicals described above are a source of copper, arsenic, and zinc, which are present in soil and groundwater within the Carlisle/Crown/U.S. Army operational area (ERM 2020c, 63–64). Disposing of waste resulting from manufacturing and testing operations onto the ground surface likely contributed to contamination, and operators may have dumped the waste on areas of the Property outside of the operational area (ERM 2020a, 93).

According to ERM, dioxins/furans were likely inadvertently produced during the production of activated charcoal and whetlerite, specifically when logs of compressed wood and sawdust were charred (ERM 2020a, 92). The manufacturing process entailed heat treatment, up to 1,800°F, of organic materials impregnated with compounds such as chlorine and copper, which could result in the formation of dioxins/furans (ERM 2020c, 92; Kobylecki et al. 2001). Concentrations of dioxins/furans were observed within the Carlisle/Crown/U.S. Army operational area as well as the Reichhold operational area (discussed further in section 4.2.3); however, these compounds were also detected outside of the former operational areas of both operators, including along the riverbank (ERM 2020c, 68). These detections beyond the operational areas may be due to the operator's dumping practices or the redevelopment activities of Hanson in the 1960s, which moved soil from the operational areas (discussed further in Section 4.2.4). In addition, waste carried within the unlined drainage ditch may have allowed contaminants to infiltrate soils and groundwater. ERM was unable to confirm whether Carlisle, Crown, and the U.S. Army used this ditch for stormwater management.

TPH and cPAHs were detected in soil and groundwater within the Carlisle/Crown/U.S. Army operational area. These contaminants are associated with ancillary charcoal and whetlerite manufacturing and testing operations through the reported use of petroleum oils and lubricants on support equipment. Typical housekeeping practices during the period of operations would likely have resulted in disposal of these materials on the Property (ERM 2020a, 95).

4.2.3 Reichhold

From 1946 to 1961, the U.S. Army leased a portion of the Property to Reichhold for manufacturing resins, glues, formaldehyde, pentachlorophenol (PCP), and sodium pentachlorophenate (Figure 3) (ERM 2020a, 25). Upon commencement of operations, Reichhold expanded the existing structures, which were situated in the northern portion of the Property, parallel to the northern Property boundary, further to the south by adding sewer and transportation systems, two tank farms, and two additional plants for production of PCP, sodium pentachlorophenate, and formaldehyde (ERM 2020a, 25–26). Property features during Reichhold's operational period also included a reactor building, drum storage areas, dry chemical storage, ammonia storage shed, a boiler, and transformers. Reichhold produced PCP between 1953 and 1956. Reichhold also sold hydrochloric acid, a by-product of PCP manufacture, as a commercial product (ERM 2020a, 25–26).

Two tank farms contained methanol, formaldehyde, phenol, urea,¹⁰ chlorine, sodium hydroxide, and hydrochloric acid (ERM 2020a, 25).

In 1955, Reichhold constructed a washwater impoundment on the eastern central portion of the property adjacent to the riverbank. This impoundment let waste and washwater from the resin and formaldehyde manufacturing processes infiltrate into the soil, until the impoundment was closed in 1960 (ERM 2020a, 25–26). Surface ditches, one present since 1936 along the southern boundary of the Property, two additional ditches in the southern portion of the Property and one in the northern portion near the PCP pilot plant were present since at least 1951 (ERM 2020a, 26). The ditches conveyed water from the process areas to the washwater impoundment and/or the LDW (ERM 2020a, 26). A property inventory dated 1963 lists the presence of two transformers and two barrels of transformer oil (ERM 2020a, 26). Transformers were present between 1940 and 1960 and were used by Reichhold and in the charcoal and whetlerite production plant (ERM 2020a, 26, 96). Evidence of a transformer bank is also documented in a marketing sales pamphlet developed for the sale of the property in 1961. Based on the date of operation, ERM notes that the transformers and transformer oil are a likely source of polychlorinated biphenyls (PCBs) (ERM 2020a, 26, 96).

Reichhold ceased all chemical manufacturing operations at the Property by 1961.

Legacy Contaminants Associated with Manufacturing of Resins, Glues, Formaldehyde, PCP, and Sodium Pentachlorophenate

Reichhold's chemical manufacturing operations are associated with PCP,¹¹ dioxins/furans, cPAHs, and diesel-range and motor oil-range TPH (ERM 2020a, 94). Releases of PCP to environmental media likely occurred during the manufacturing process, as spills or releases via process water, wastewater, and washwater that was discharged to ditches, the washwater impoundment, and the embayment (ERM 2020a, 94).

Reichhold's PCP manufacturing was the only source of PCP at the Property. PCP was detected in all sampled environmental media, including saturated and unsaturated soils, shallow and deep groundwater, and stormwater solids (ERM 2020a, 66). Concentrations of PCP were observed in the central, eastern, and northern portions of the Property, within the former Reichhold operational area. The highest PCP concentrations were observed within the former washwater impoundment, adjacent to the central part of the riverbank (ERM 2020a, 66).

Dioxins/furans are an impurity associated with the manufacture of PCP (EPA 2006, 458–459).

Dioxins/furans were detected near the PCP production plant at concentrations above screening levels (ERM 2020a, 94). Discharged process wastewater likely contained dioxins/furans, as evidenced by dioxin/furan concentrations within the former washwater impoundment (ERM 2020a, 68–69). Dioxins/furans were also

¹⁰ Urea is the diamide of carbonic acid and is also called carbamide. Urea is used as a fertilizer and feed supplement and as a starting material for the manufacture of plastics and drugs (Encyclopaedia Britannica 2020, 1).

¹¹ Additional SVOCs, including 2,4,6-trichlorophenol, 2,4-dichlorophenol, and phenol were identified by ERM as contaminants at the Property, however the detections of these additional SVOCs were co-located with detections of PCP. Therefore, PCP is considered representative of all SVOCs.

detected along the riverbank and in the central and northeast parts of the Property, within both the Reichhold and U.S. Army operational areas, connecting both operations to these dioxins/furans (ERM 2020a, 68–69). The highest dioxin/furan concentrations were observed along the riverbank and within Reichhold's operational area, including the washwater impoundment, PCP production plant, and the historical tank farms (ERM 2020a, 68–69). However, dioxins/furans were not exclusively detected within the footprint of Reichhold's operations. The distribution in other portions of the Property is likely due to the transportation of stormwater and wastewater containing dioxins/ furans in the unlined ditches across the southern portion of the Property (ERM 2020a, 20), and to the redevelopment activities of Hanson in the 1960s, which moved soil from the operational area (discussed further in Section 4.2.4).

TPH and cPAHs were detected in soil and groundwater in the Reichhold operational area. These contaminants were associated with ancillary operations, including the use of petroleum oils and lubricants on equipment conducted by Reichhold to support the manufacturing facility. Typical housekeeping practices during the period of operations would have likely resulted in disposal of these materials on the Property (ERM 2020a, 95).

4.2.4 Hanson Permanente Cement, Inc.

The U.S. Army sold the Property to the Port in 1964, and the Port subsequently leased the property to Hanson on the condition that Hanson develop the property (ERM 2020a, 26). Once redevelopment was completed in 1969, Hanson operated a cement terminal at the Property, storing and shipping cement. Hanson did not manufacture cement at the Property (Figure 3) (ERM 2020a, 27). Activities conducted by lessees during Hanson's ownership include asphalt and concrete crushing and storage of cement containers, related equipment, and cargo (ERM 2020a, 21). ERM does not provide detail about the specific cargo or type of container.

In 1969, the Port sold the Property to Hanson under a real estate contract, and Hanson continued its operation of the cement terminal (ERM 2020a, 27). Hanson continued storing and shipping cement until selling the Property to Lone Star Industries, Inc. in 1987 (ERM 2020a, 28).

Legacy Contaminants Associated with Storing and Shipping Cement

Contribution to environmental media contamination from Hanson's operation are presumed to be limited to cPAHs and TPH. Hanson operated and likely performed maintenance on vehicles, trucks, and equipment, which may have resulted in releases of TPH and cPAHs to environmental media via spills and leaks.

Hanson Activities that Disturbed or Exacerbated Legacy Contamination

Hanson redeveloped the Property to construct a cement terminal. This required extensive grading, excavating, and relocating of soils that contained contaminants from prior operations at the Property. From 1965 to 1969, Hanson demolished the Carlisle/Crown/U.S. Army and Reichhold facilities and regraded the underlying soils in the footprints of these facilities; however, the total amount of soil removed and/or redistributed during the removal of the facilities, including building foundations, is unknown (ERM 2020a, 95). Hanson placed substantial amounts of demolition debris, primarily broken concrete, as fill for the riverbank. Following the demolition, Hanson excavated foundations for its cement terminal, ancillary support

buildings, and stormwater system, which were primarily located within the former Carlisle/Crown/U.S. Army and Reichhold operational areas (ERM 2020a, 26–27, 95–96; ERM 2020c, 82). To construct the foundation for its cement silos, Hanson removed an estimated 2,000 cubic yards of material from the shallow and dredge fill soil layers. In addition, Hanson removed up to 2 ft of shallow fill soil to construct ancillary support buildings (ERM 2020a, 95–96; ERM 2020c, 82). Hanson also filled in the historical drainage ditches that ran along either end of the log storage and treatment area used by Mineralized-Cell. In addition, Hanson excavated of the unlined ditches within the northern portion of the property used by the previous operators for stormwater and wastewater conveyance.

Based on the distribution of contaminated soil across the Property beyond the operational source areas, soil containing contaminants associated with the Carlisle/Crown/U.S. Army and Reichhold's operations (arsenic, copper, zinc, PCP, dioxins/furans, TPH, and cPAHs) were distributed across the Property during Hanson's regrading activities in the former building locations.

According to ERM, Hanson filled in the historical drainage ditches that ran along either end of the log storage and treatment area used by Mineralized-Cell (ERM 2020c, 82). A review of historical aerial photographs indicates that Hanson placed substantial material along the riverbank, thereby expanding the upland portion of the Property further east into the LDW (ERM 2020a, 23, 95–96). Soils may have also been moved from near the former transformers to the riverbank, as soils collected near the original location of the former transformers during the 2020 RI investigation did not contain concentrations of PCBs above screening levels, while riverbank soils did (ERM 2020a, 95–96). ERM concluded that soils with high concentrations of PCBs were moved from their initial location and placed along the riverbank (ERM 2020a; ERM 2020c, 82). In 1975, Hanson constructed a stormwater system in the southern property portion. The system connected five catch basins to a 15-inch diameter concrete pipe that discharged to a 48-inch diameter outfall pipe, owned and operated by Seattle Public Utilities. The outfall discharges to the LDW within the adjoining property to the south, Port of Seattle's Terminal 115 (T-115) (ERM 2020a, 20). The stormwater system was filled with concrete and abandoned prior to Glacier Northwest's acquisition of the property in 1991 (ERM 2020a, 20).

Soils along the riverbank contain arsenic, copper, zinc, PCBs, PCP, and dioxins/furans at concentrations above screening levels (ERM 2020a, 62–64, 66–69, 95–96). ERM concluded that the presence of these contaminants in these soils is likely a result of Hanson's redistribution of soils during its redevelopment activities (ERM 2020a, 95–96).

4.2.5 Ash Grove Cement Company

Lone Star Industries, Inc. owned the property for a short time in 1987 before conveying it to Lone Star Northwest GP. Ash Grove Cement Company (Ash Grove) leased the Property between 1987 and 1991 and continued to operate the Property as a cement terminal. The only change Ash Grove made to cement terminal equipment at the Property was the replacement of the ship unloader and conveyance system (ERM 2020a, 28). The cooling system was also overhauled. Lone Star Northwest GP owned the Property until 1991, when it was sold to Glacier Northwest in two separate conveyances in 1991 (ERM 2020a, 28).

Legacy Contaminants Associated with Storing and Shipping Cement

Contribution to environmental media contamination from Ash Grove's operation are presumed to be limited to cPAHs and TPH. Ash Grove operated and likely performed maintenance on vehicles, trucks, and equipment, which may have resulted in releases of TPH and cPAHs to environmental media via spills and leaks.

4.2.6 Glacier Northwest

Glacier Northwest acquired the Property in 1991 and has operated the cement storage and distribution terminal originally built by Hanson since that time (Figure 3). The northern portion of the Property is used for shipping and receiving and storing dry cement and small volumes of coal fly ash¹² and slag cement¹³. Up to 780,000 tons of cement are delivered to the Property via ship annually (ERM 2020a, 18). Glacier Northwest uses the southern portion of the Property for vehicle and equipment storage, warehousing, and maintenance. Ancillary operations conducted by lessees (Figure 4) at the Property include crane equipment storage, storage and repair of shipping containers, trailers, chassis, power equipment, equipment storage and maintenance, and wood pallet construction (ERM 2020a, 22).

Contaminants Associated with Current Operations

Diesel-range and motor oil-range TPH and cPAHs are the contaminants that may be associated with Glacier Northwest's operations at the Property. Glacier Northwest operates and performs light maintenance on vehicles and equipment, which may result in spills and releases of these contaminants to environmental media; however, there have been no reported petroleum releases to the Property since 1991 (ERM 2020a, 99).

4.2.7 Off-Property Sources

The Property is bordered to the north by the Duwamish Shipyard, Inc. property and to the south by the T-115 property. Both properties are cleanup sites. Zinc and tributyltin (TBT) were detected along the boundaries of the Property with these adjoining properties.

Zinc was also detected off the Property to the north and south on the Duwamish Shipyard, Inc. and T-115 properties, respectively. Although there are known sources of zinc on the Property, ERM cannot confirm the proportion of zinc present on the Property that is attributable to operators of the adjoining properties (ERM 2020a, 64). TBT was detected above screening levels in saturated soils located in the northeast corner of the Property. There are no known historical or current sources of TBT on the Property. Thus, ERM attributed the TBT present in this area to Duwamish Shipyard, Inc.'s operations (ERM 2020a, 90).

¹² Coal fly ash is a by-product of coal-fired power plants and is commonly recycled for use in cement and concrete products (DOT 2016).

¹³ Slag Cement is cement produced using recycled blast furnace slag and is typically used in ready-made concrete, precast concrete, masonry, soil cement, and high temperature resistant building products (Slag Cement Association 2020).

4.2.8 Historical Operations Summary

Based on the review of the provided documents (Appendix A), historical operations can be summarized as follows:

- The Property has been in continuous industrial use since 1936 (Figure 4).
- The following three operators contributed the majority of contamination of environmental media at the Property:
 - Mineralized-Cell, with wood preservation and treatment
 - Carlisle, Crown, and the U.S. Army, with charcoal and whetlerite manufacturing and testing
 - Reichhold, with chemical manufacturing
- The cement storage and distribution operations of Hanson, Ash Grove, and Glacier Northwest contributed a de minimis share of contamination to the Property as compared to the three primary operators.
- The main contaminants detected in environmental media and determined by the 2020 RI exceeding applicable screening levels that will require remediation are arsenic, copper, dioxins/ furans, PCP, diesel-range and motor-oil-range TPH, cPAHs, and zinc.
- The presence of contaminants outside the original operational areas indicate that Hanson's redevelopment activities moved the contaminants from their source areas to other areas of the Property. For example:
 - Arsenic and Copper
 - The highest concentrations of arsenic, copper, and zinc were observed beneath the former operational area of Mineralized-Cell.
 - Arsenic, copper, and zinc can also be associated with the operations conducted by Carlisle, Crown, and the U.S. Army.
 - Arsenic and copper are distributed throughout the Property in both soil and groundwater beyond the operational areas of Mineralized-Cell and Carlisle/Crown/U.S. Army.
 - Dioxins/furans and PCP
 - Dioxins/furans were associated with both the operations of Carlisle/Crown/U.S. Army and Reichhold, with the highest concentrations detected below the operational areas associated with these operators.
 - PCP is associated with Reichhold's former operations, and the highest concentrations of PCP were detected in the footprint of the former Reichhold manufacturing area.
 - Dioxins/furans and PCPs were also observed in lower concentrations in areas where there is no associated source.

- PCBs, TPH, and cPAHs
 - According to ERM, PCBs were initially deposited in the soils in the vicinity of the former transformers. But PCB detections are primarily located in riverbank soils and not in the vicinity of the former transformers; therefore, ERM determines that PCBs were redistributed to riverbank soils during Hanson's redevelopment activities (ERM 2020a, 99).
 - Both TPH and cPAHs were detected across the Property in all environmental media types and were associated with all former operators, including, to some lesser degree, the former and current cement terminal operations.
- Overlapping operational areas, contaminants associated with more than one party, distribution of waste by several parties in areas beyond operational areas, and redevelopment activities that moved contaminants from source areas all complicate assigning contamination to a specific historical source.

For this reason, TIG created an algorithm that weighs factors to determine responsibility for specific contaminants and the cost associated with their past investigation and remediation (Figure 5). TIG's algorithm apportions the past investigation cost according to a set of metrics that will include scores for contaminants of concern, duration of operations, operational areas on the Property, and an exacerbation factor that applies to parties that performed redevelopment and moved contaminants from source areas to other areas on the Property.

4.3 Previous Investigation and Remediation Activities

Glacier Northwest and Reichhold completed multiple investigations and remediations at the Property as independent remedial actions before they entered the AO with Ecology. Since 2009, Ecology has been overseeing the remedial activities under the AO, which consist of investigations to further characterize contamination at the Property, to determine the nature and extent of the contamination present at the Property, and to evaluate potential cleanup actions. The following sections summarize the investigations and remediations completed at the Property by Glacier Northwest and Reichhold.

4.3.1 RETEC RI (1996)

In 1996, RETEC completed a RI. For the RI, RETEC sampled soil from 14 test pits (TP-1 through TP-14), 25 borings (GP-1 through GP-25) and seven monitoring wells (MW-1S, MW-1D, MW-3S, MW-3D, MW-5S, MW-6S, and MW-7S). The soil samples were analyzed for PCP, chlorinated phenols, TPH, arsenic, silver, and formaldehyde (ERM 2020a, 45). The suite of analytes suggests that this investigation assessed contamination associated with the historical activities of Reichhold and Carlisle/Crown/U.S. Army.

4.3.2 Fluor Daniel GTI Pre-Remedial Action Characterization (1998)

Between November 1997 and October 1998, Fluor Daniel GTI installed monitoring wells (MW-8S through MW-14S and MW-16S through MW-21S) and collected soil samples. The collected samples were analyzed for arsenic and PCP. Monitoring wells MW-8S and MW-9S were installed at the former Reichhold PCP plant to conduct pilot remediation studies (ERM 2020a, 45).

4.3.3 Fluor Daniel GTI Treatability Studies for PCP and Arsenic in Groundwater (1998)

In 1998, Fluor Daniel GTI conducted treatability and pilot studies to determine the feasibility and effectiveness of using various methods to treat arsenic and PCP in groundwater. The two remedial actions ultimately implemented were hydrogen peroxide fixation for arsenic and ozone sparging for PCP (ERM 2020a, 45–46).

4.3.4 IT Corporation Hydrogen Peroxide Fixation, Arsenic in Groundwater Remediation (2000)

In 2000, IT Corporation installed a hydrogen peroxide gallery in the south-central area of the Property, intending to remediate arsenic contamination in groundwater. This system enabled contractors to regularly inject hydrogen peroxide into the subsurface to geochemically fix the arsenic to the surrounding environmental media, preventing further groundwater contamination (ERM 2020a, 50).

4.3.5 Ozone Sparging System to Remediate PCP in Groundwater (2000)

In 2000, a total of 50 sparge wells and a soil vapor extraction system were installed on the Property as a part of a plan to remediate PCP contamination in groundwater using ozone sparging. The system was operated until 2005, when post-treatment monitoring began (ERM 2020a, 50).

4.3.6 Shaw Arsenic Investigations (2003)

In July 2003, Shaw Environmental and Infrastructure, Inc. (Shaw) installed six groundwater monitoring wells (MW-22S through MW-27S) and collected soil samples. The soil samples were analyzed for arsenic, and the monitoring wells were installed to delineate arsenic contamination in shallow soil (ERM 2020a, 45). Shaw continued to conduct periodic groundwater sampling and remediation performance testing for PCP between 2004 and 2007.

4.3.7 Shaw Groundwater Sampling for PCP (2004-2007)

Shaw performed periodic groundwater sampling for PCP between 2004 and 2007 to assess the effectiveness of the PCP groundwater remediation system (ERM 2020a, 46).

4.3.8 ERM Upland and Riverbank Soil and Groundwater Investigations (2009–2019)

Between 2009 and 2014, ERM evaluated the contamination present in soil and groundwater on the upland and riverbank portions of the Property. ERM conducted an additional investigation in 2019 to address the existing data gaps. These investigations were completed in accordance with the AO between Ecology and Glacier Northwest and Reichhold. Samples were analyzed for one or more of the following: metals, SVOCs,

PCBs, dioxins and furans, TPH, and VOCs (ERM 2012, 60–65). The investigations and associated sampling are described below:

- **Upland soil sampling:** ERM drilled a total of 49 soil borings into the shallow fill, dredge fill, and aquitard soil layers present throughout the upland portion of the Property. Several soil samples were collected from each boring.
- **Riverbank soil sampling:** In January 2014, ERM drilled seven borings at locations throughout the riverbank. Five of the seven borings were advanced to the silt aquitard interface soil layer, and the remaining two contacted impervious surfaces or armoring prior to the interface.
- **Ground-penetrating radar survey:** ERM hired a subcontractor, GeoPotential, to conduct a ground-penetrating radar survey of the Property, to search for a historical drainage ditch and to complete a secondary check for buried utilities.
- **Monitoring well installation and groundwater sampling:** In 2009, ERM installed 18 new monitoring wells (MW-28S through MW-45D). Ten of the wells were drilled into the shallow aquifer, and the remaining eight were drilled into the deep aquifer, which lies below the silt aquitard soil layer. Both soil and groundwater samples were collected during well installation activities, and ERM continued to sample groundwater through 2015.
- **Stormwater sampling:** In 2012 and 2013, ERM conducted four stormwater sampling events and collected one stormwater sample from the same location during all four events. In 2012, ERM collected samples of the sediments and solids that accumulated within the stormwater conveyance system. Four total samples were collected from three locations within the system.
- **Historical stormwater system pipe investigation:** During a 2014 subsurface investigation, ERM discovered an abandoned historical stormwater pipe. After excavating the pipe, ERM sampled the solids within the system. ERM estimated that the pipe was constructed in 1975 and abandoned prior to 1991 (ERM 2020a, 53–54, 56, 76). ERM collected two samples from within the historical system.
- **ERM sediment investigation:** Between 2012 and 2014 ERM collected 20 surface sediment samples and 17 sediment cores from within the embayment and the berthing area.
- **Data gaps investigation:** In 2019, ERM conducted an investigation to fill data gaps that remained following all previous investigations, specifically to characterize arsenic, dioxin/furan, and PCB contamination in soils. A total of eight borings were advanced to the depth of the silt aquitard soil layer and were analyzed for arsenic, dioxins/furans, and total PCBs.

5. Compliance with MTCA, the AO and NCP

The remedial actions performed at the Property since 2009 were performed under the oversight and review of Ecology and the AO and are compliant with the AO and the MTCA (Chapter 70.105D RCW) and the MTCA Cleanup Regulation (Chapter 173-340 Washington Administrative Code (WAC)).

The remedial actions performed at the Property prior to 2009 were performed voluntarily and without direct Ecology oversight at the time. The available information indicates the actions were performed to determine the nature and extent of contamination at the Property, to address and remediate groundwater contamination at the Property, and to reduce the impacts to human health and the environment. In addition, the data from the pre-2009 activities were summarized and incorporated into the ERM RI, which was reviewed and approved by Ecology. For these reasons, it is TIG's opinion that the pre-2009 remedial actions are compliant with MTCA, including the requirements for remedial investigations under WAC 173-340-350 and the requirements for interim actions under WAC 173-340-430.

The pre-2009 investigations and remedial actions performed by Glacier Northwest and Reichhold, when evaluated as a whole, are the substantial equivalent of comparable remedial actions conducted or supervised by Ecology. Previous work included essential procedures required per WAC 173-340-300 Site Discovery and Reporting, WAC 173-340-515 Independent Remedial Actions, and the main elements of a formal RI conducted or supervised by Ecology per WAC 173-340-350. Pre-2009 investigations and interim actions included appropriate scoping, multiple rounds of data collection to characterize the nature and extent of contamination, and considered and evaluated existing data to assess environmental media at the property per WAC 173-340-350 (7). Groundwater remediation activities comply with WAC 173-340-430 (4), which states that interim action may occur anytime during the cleanup process of a site. The remedial activities also comply generally with the purpose, requirements, and cleanup action relationship of interim actions (WAC 173-340-430, (1) through (3)).

It is TIG's opinion that the remedial actions performed by Glacier Northwest and Reichhold were also performed in general compliance with the NCP. The NCP was developed in 1968 in response to an oil tanker spill. The NCP was broadened in 1972, due to the passing of the Clean Water Act, to include a framework for responding to hazardous substance releases. Following CERCLA in 1980, the NCP was further broadened to cover releases at hazardous waste sites. Compliance with MTCA, although established post CERCLA in 1989, equates compliance with the NCP.

TIG has reviewed the costs incurred by Glacier Northwest and Reichhold to perform the remedial actions at the Property. The costs consist of consulting charges, attorneys' fees, and Ecology oversight costs relating to the completed remedial actions.

TIG reviewed 536 invoices issued by consultants, law firms, and Ecology and compared them against the remedial actions described in the 2020 RI. Under MTCA, attorneys' fees can constitute remedial action costs, when the services of the attorney relate to an action conducted consistent with MTCA to identify, eliminate, or minimize any threat or potential posed by hazardous substances to human health or the environment, including any investigative and monitoring activities and any health assessment or health effects studies (RCW 70.105D.080 WAC 173-340-220).

Based on review of the provided invoices, it is TIG's opinion that the total cost of \$8,604,890.98 is recoverable under MTCA. These include consultant, law firm, and Ecology invoices.¹⁴

¹⁴ Invoices that appeared unrelated to the upland cleanup at the Property were excluded. Attorney invoices were evaluated for association between legal cost and investigations at the Property.

6. Allocation of Glacier Northwest and Reichhold Costs

The provided invoices contain sufficient information to identify the costs of the remedial actions completed by Glacier Northwest and Reichhold and to identify the general tasks conducted by each consultant, law firm, or Ecology, but insufficient detail to attribute the cost of each completed remedial action to a specific operator or contaminant. Therefore, it was not feasible to allocate the costs of the completed remedial actions to specific operational areas, environmental media types, and/or COCs. TIG therefore created an algorithm to allocate the costs of the completed remedial actions using a set of metrics commonly used in allocation proceedings.

The algorithm apportions the costs of the completed remedial actions according to a set of metrics that include scores for COCs determined by the 2020 RI to require further investigation or cleanup, the duration of operations of each operator since 1936, the operational areas of these operators on the Property, the associated duration of ownership of parties that owned a portion or the entirety of the Property (Tables 1 through 4). After assigning a percentage of the cost of the completed remedial actions (a Liability Share) to each individual owner or operator (Table 5), an exacerbation factor was applied to parties that exacerbated existing contamination in the course of redeveloping the Property

As a final step, the Liability Shares allocated to parties other than Glacier Northwest, Reichhold, and Hanson are reallocated to the three parties in proportion to their Liability Shares (Figure 5) (*Glacier Northwest, Inc. v Kaiser Gypsum Company, Inc., et al.* 2020).

6.1 Costs Incurred at the Property

Based upon review of all provided invoices, the total costs incurred by Glacier Northwest and Reichhold to investigate and remediate the Property equals \$8,604,890.98. TIG determined that most of the costs were incurred after the AO became effective in 2009.

Consultant/Agency	Time Period of Investigations	Total Cost
ERM	June 2009–April 2020	\$4,854,108.50
RETEC	January 1996–October 1996	\$102,918.15
IT Corp	October 1998– December 2000	\$368,108.15
Shaw	July 2008–November 2008	\$203,072.19
Fluor Daniel-GTI	September 1997–October 1998	\$70,725.04
Ecology	October 2009–March 2019	\$723,849.23
CH2MHill	December 2007–November 2014	\$542,680.93
Anchor QEA	March 2015–March 2020	\$138,600.14
Preston Gates Ellis	January 1991–November 1993	\$24,331.66

Consultant/Agency	Time Period of Investigations	Total Cost
Perkins Coie	November 2003–February 2010	\$301,524.55
Ater Wynne	October 2008–October 2014	\$976,060.16
Veris Law Group	August 2012–March 2020	\$298,912.28
Total Cost		\$8,604,890.98

6.2 Allocation of Costs

TIG allocated a Liability Share to all current and previous owners and operators of the Property using an algorithm that weights the contaminants associated with each operator, the duration of each party's ownership and/or operations, and the size of the operational area associated with each owner and operator, and the extent to which a party contributed new contamination or exacerbated existing contamination at the Property. TIG also allocated a Liability Share using the same algorithm to operators of adjoining property, whose operations have been determined by ERM to be a source of contamination at the Property.

6.2.1 Step 1: Derive the Relative Weight of Property COCs

The first step of the algorithm is to assign a percentage of contamination at the property attributable to each COC.

TIG used the work conducted by ERM as representative of all remedial actions conducted at the Property, given that the work performed under the AO represents approximately 80 percent of the total cost incurred by Glacier Northwest and Reichhold, was performed over the longest time period, and information provided about investigations prior to ERM's work is limited. Throughout its 10 years of investigating the Property, ERM collected over 6,000 samples of environmental media and analyzed them for six contaminant groups (metals, SVOCs, VOCs, PCBs, TPH, dioxins and furans). ERM compared the analytical results to screening levels that apply to upland sites that are located within the Source Control Area of the LDW Superfund Site per Ecology's Lower Duwamish Water Preliminary Cleanup Level Workbook (Ecology 2019). Based on this comparison of analytical results and screening levels, ERM used the following criteria to determine which contaminants present at the Property represent a COC:

- The contaminant was detected in all environmental media types or
- The contaminant was detected in at least two environmental media types above the screening levels and
- The contaminant concentration exceeded the screening level in more than 10 percent of the samples analyzed and
- The contaminant concentration exceeded the screening level by at least twice the screening level.

Using these criteria, ERM determined the following contaminants to be COCs at the Property: arsenic, copper, zinc, PCP, PCBs, dioxins and furans, TPH, TBT, and total cPAHs. ERM provided the total number

of samples collected in soil and groundwater¹⁵ for each COC and their “percent exceedance”¹⁶ based on how often a given contaminant exceeded its screening criteria. TIG multiplied the total number of samples ERM collected and analyzed for a COC by this percent exceedance.¹⁷ TIG then calculated the proportion of the total contamination attributable to a specific COC by taking the ratio of the number of samples that exceeded for each COC to the total number of samples that exceeded screening levels. The following example illustrates the series of steps followed to calculate this proportion using the arsenic data:

- a) Total number of arsenic samples collected in soil and groundwater at the Property: 621 samples
- b) Average frequency of arsenic exceeding screening levels in soil and groundwater at the Property: 63.73 percent (i.e., the percent exceedance)
- c) 63.73 percent of 621 samples is 396 samples, which is the number of samples that exceeded the arsenic screening level
- d) Complete the previous two steps for all COCs to obtain a Property-wide total number of samples exceeding their respective screening levels: 1,094 samples
- e) 396 divided by 1,094 is 36.19%, which means arsenic accounts for 36.19% of all samples that exceed screening levels

In other words, 36.19 percent of the Property-wide investigation and remediation costs are effectively attributable to arsenic contamination present in soil and groundwater at the Property. The results for Step 1 are presented in Table 1.

6.2.2 Step 2: Derive the Relative Contributions of Each Property COC by Each Operator

The second step of the algorithm is to assign a percentage of responsibility to each operator for contamination present at the property. In order to calculate the relative contributions of COCs by each operator, TIG assigned the COCs to the six major operators of the Property (Mineralized-Cell, Carlisle/Crown/U.S Army, Reichhold, Hanson, Ash Grove, and Glacier Northwest), and to the two major operators of adjoining properties, based on ERM's assessment in the 2020 RI.

TIG assigned responsibility for Property COCs to each operator group based on the historical ownership and operational information provided by ERM. ERM determined the association between former and current operators and Property COCs in the 2020 RI report (ERM 2020a, 20–30, 90–102) (Table 2).

¹⁵ Sediment samples were not included in this calculation.

¹⁶ Typically, cost allocation models use enrichment factors rather than exceedance frequencies. TIG did not use enrichment factors because the use of enrichment factors would have skewed the percent allocations to each COC disproportionately to PCP and PCBs, that is more than 99 percent, due to the low screening levels for these compounds.

¹⁷ An average frequency was calculated from the frequency of exceedance of each environmental media type.

To assign a share for each COC to an operator, TIG calculated a time-weighted area by multiplying the years of operation of each operator by the square footage of the operational area. These steps are shown in the following example using the calculations for Mineralized-Cell:

- a) Mineralized-Cell operated for four years on 371,252 square feet of the Property.
- b) 371,252 square feet multiplied by 4 gives the time weighted area of 1,485,008 for Mineralized-Cell.
- c) This number is representative of both the physical size of Mineralized-Cell's operations, as well as the time over which their operations were conducted.

TIG then used this time weighted area to divide the cost of a specific COC to each operator. This was done by dividing the individual time weighted areas for each operator by the total time weighted area among all operators that are associated with that COC. For Mineralized-Cell and arsenic this means:

- Mineralized-Cell's time weighted area is 1,485,008
- Mineralized-Cell and the U.S. Army are the two operators associated with arsenic contamination at the Property
- The sum of Mineralized-Cell's and Carlisle/Crown/U.S. Army's time weighted areas is 2,031,256
- Mineralized-Cell's proportion of this total is 73%, which was calculated by dividing 1,485,008 by 2,031,256.

Therefore, Mineralized-Cell would be responsible for 73 percent of the costs associated with arsenic contamination at the Property, and Carlisle/Crown/U.S. Army would be responsible for the remaining 27 percent.

TIG assumed that 2 percent of contamination is attributable to the two off-Property operators¹⁸: Duwamish Shipyard, Inc. (former adjoining operator to the north) and the Port of Seattle (current adjoining operator of T-115 to the south). TIG assigned 2 percent each of the total time weighted area of all operators to the off-property operators. This means that for all contaminants associated with the two off-Property operators, each off-Property operator would receive a share of the COCs for which they are associated with as if they had occupied 2 percent of the total time weighted area of the Property. Duwamish Shipyard, Inc. is also the only known source of TBT contamination at the Property, therefore it was assigned 100 percent of the responsibility associated with this COC.

The proportion of contributions based on the time-weighted areas are summarized in Table 2.

6.2.3 Step 3: Multiply the Results of Steps 1 and 2 to Derive the Percent of the Costs Attributable to Each Operational Period for each COC:

The third step of the algorithm assigns a share of incurred costs to each operational period. To do this, TIG multiplied the results derived in step 1 (the relative weight of each COC) with step 2 (the percentage of an

¹⁸ TIG assigned 2 percent of the contribution of off-property operators, based on information provided in the 2020 RI. Because the off-property operators cannot be assigned a time weighted area, this percentage was determined based on TIG's professional judgement and the available information in the 2020 RI.

individual COC for which an operator is responsible) to derive a total percentage of the costs attributable to an operational period, on a COC by COC basis. An example using the Mineralized-Cell operational period is included below.

- a) We determined in Step 1 that 36.19 percent of the contamination present at the Property at concentrations above screening levels is arsenic, therefore 36.19 percent of the costs incurred by Glacier Northwest and Reichhold are attributable to arsenic (see section 6.2.1).
- b) We determined in Step 2 that Mineralized-Cell is responsible for contributing 73 percent of that arsenic, and therefore is responsible for paying 73 percent of the arsenic associated costs (see section 6.2.2).
- c) Multiplying these percentages is 26.46 percent, which is the percentage of Glacier Northwest's and Reichhold's total costs attributable to arsenic contamination that occurred during the Mineralized-Cell operational period.

As a result, Mineralized-Cell is assigned a 26.46 percent share of the total investigation costs due to its arsenic contributions alone. Additional percentages were also assigned using this same methodology for all other COCs attributable to the Mineralized-Cell operational period. The sum of these percentages, 43.43 percent, is the total share assigned to Mineralized-Cell operational period.

The results of Step 3 are summarized in Table 3. Next, TIG added a cost for share for owners within a given operational period.

6.2.4 Step 4: Assign Responsibility to Property Owners during Operating Periods

Step 4 of the algorithm intends to assign a share of the costs associated with an operational period to both the operators and the owners of the Property in each operational period. To do this, TIG assumed that the owners bear some responsibility for what the operators released during their tenure at the Property but less so than the operator. TIG assumed that owners had 10 times less impact than operators. Or phrased differently, the operators caused ten times the contamination that the owners did. Once this factor was assigned, the proportion of each owner and operator was calculated. The following is an example calculation using the Mineralized-Cell operational period, and the owners and operators associated with it.

- During Mineralized-Cell's four years of operations, King County owned the Property
- King County is assigned a weight of 1 as the Property owner and Mineralized-Cell is assigned a weight of 10 as the Property operator. Adding these two weights is a total weight of 11 for the Mineralized-Cell operational period.
- To obtain King County's cost proportion for the Mineralized-Cell operational period, the ratio of its weight of 1 to the total weight of 11 was taken, which is 9%.
- Mineralized-Cell's proportion is 91%, the ratio of 9 to 11.

In other words, Mineralized-Cell would pay 91 percent of any costs associated with their operations, and King County would pay for the remaining 9 percent.

This same sequence of calculations was performed for all operational periods. TIG applied a weight of 1 to all owners within each operational period, and a weight of 10 to all operators, and used these proportions to

obtain a proportion of costs associated to each owner and operator. The results of Step 4 are shown in Table 4

6.2.5 Step 5: Assign a Liability Share to Each Owner and Operator

In order to assign a Liability Share to each owner and operator, TIG multiplied the proportion of costs attributable to an operational period, calculated in Step 3 (Table 3) by the proportion of the operational period costs attributable to each owner and operator associated with that operational period, calculated in Step 4 (Table 4) above. An example using the percentages calculated in Step 3 and Step 4 for Mineralized-Cell is included below.

- The Mineralized-Cell operational period was assigned 43.43 percent of the total cost in Step 3 (Table 3), and Mineralized-Cell as an operator was assigned 91 percent of those costs in step 4 (Table 4).
- Multiplying these percentages is 39.48 percent. This means that 39.48 percent of the total cost is attributable to Mineralized-Cell's operations, and therefore, Mineralized-Cell as an operator would pay 39.48 percent of the total past cost.
- King County, as an owner during this operational period, was assigned a 9 percent share in Step 4 (Table 4) of the 43.43 percent share assigned to the Mineralized-Cell operational period in Step 3 (Table 3).
- Multiplying these percentages is 3.90 percent. This means that 3.90 percent of the total cost is attributable to King County's ownership of the Property during Mineralized-Cell's operations, and therefore King County as an owner would pay 3.90 percent of the total cost. King County also received an additional share for its ownership during the U.S. Army operational period.

The percent shares for each owner and operator party is summarized in Table 5.

6.2.6 Step 6: Account for Exacerbation of Existing Contamination During Redevelopment Activities and Reallocation of Costs between the Remaining Liable Parties

Step 6 of the algorithm is to assign responsibility for contamination exacerbated by redevelopment of the Property. According to ERM, Hanson redeveloped the Property between 1965 and 1969, and in doing so dispersed existing contamination to portions of the Property where no known sources existed and placed contaminated soil along the riverbank.

In the absence of a quantifiable amount of soil that was moved, or costs that could be associated with investigations that solely investigated the redistribution of soils, TIG determined that it is reasonable to reassign to Hanson 15 percent of the liability otherwise attributable to the owners and operators that predated Hanson, because Hanson's activities dispersed their contamination to areas it was not before. A reassignment to Hanson of 15 percent would represent a more than de minimis contribution by Hanson to the contamination at the Property, which is supported by the technical data, while maintaining primary responsibility for the contamination with the original polluters.

Thus, TIG proposes the following:

- The exacerbation factor for Hanson is calculated by redistributing to Hanson 15 percent of the Liability Shares assigned in Step 5 to parties that owned or operated the Property before Hanson commenced the redevelopment activities. The redistribution results in adjusted Liability Shares to Hanson and the owners and operators that pre-dated Hanson, as follows:
- The Liability Shares assigned in Step 5 to the owners and operators that pre-dated Hanson is 90.84 percent.
- 15 percent of 90.84 percent is 13.63 percent
- Adding 13.63 percent to Hanson's initial Liability Share of 1.26 percent results in an adjusted Liability Share for Hanson of 14.88 percent.
- The Liability Shares of the owners and operators that pre-dated Hanson, including Reichhold, are adjusted downward as reflected on the table below.

Party	Liability Share after Step 5	Liability Share After Reallocation of 15%
Mineralized Cell	39.48%	33.56%
Reichhold	27.49%	23.36%
US Army	15.50%	13.17%
King County	4.72%	4.01%
U.S. Government	3.52%	2.99%
Carlisle	0.13%	0.11%

If all parties were still in existence and participating in Hanson's bankruptcy, this step would represent step in the allocation and would result in distribution of the past remedial action cost of \$8,604,890.98 incurred by Reichhold and Glacier Northwest to each owner and operator. However, only Glacier Northwest, Reichhold (via Glacier), and Hanson are participants in Hanson's bankruptcy, and the costs of the non-participants need to be fairly allocated between them. Therefore, the "non-participating" parties shares must be distributed between Glacier Northwest, Reichhold, and Hanson, as provided in Step 7 (see below).

6.2.7 Step 7: Reallocate Liability Shares between Participating Parties

Step 7 involves the redistribution of the Liability Shares assigned to all parties other than Glacier Northwest, Reichhold, and Hanson under Steps 5 and 6. The collective Liability Shares of these non-participants equals 60.36 percent. These Liability Shares are redistributed between Reichhold, Glacier Northwest, and Hanson, proportionally to the Liability Shares assigned to these three parties under Steps 5 and 6. This redistribution results in a final Liability Share of 58.94 percent to Reichhold, 3.52 percent to Glacier Northwest, and 37.54 percent to Hanson.

The outcome is summarized in the table below and in Table 6.

Party	Liability Share after Step 5	Increase or Decrease to Liability Share after Step 6	New Liability Share After Exacerbation ⁶ 9.86	Final Allocation to Remaining Parties	Total Cost
Reichhold	27.49 %	-4.12%	23.36 %	58.94%	\$5,071,521.86
Glacier Northwest	1.39 %	0%	1.39 %	3.52%	\$302,771.79
Hanson	1.26 %	+13.63%	14.88%	37.54%	\$3,230,597.33
Total Non-Participant Share	69.86 %	- 9.50%	60.36%	--	--

7. Summary and Conclusions

To conduct this evaluation, TIG reviewed existing reports and data provided by counsel to answer the following questions:

- Which parties and their operations are responsible for the contamination at the Property?
- What are the contamination sources with respect to area, environmental media type, and/or contaminant?
- Can the completed investigations and remediations be linked to an operational area, environmental media type, and/or contaminant?
- Can the cost of the completed investigations and remediations be distributed between the historical owners and operators of the Property? If so, how?
- Were the completed investigation and remediations performed in compliance with the MTCA and NCP, as well as per the requirements of the AO between Glacier Northwest, Reichhold, and Ecology?

Based on the documentation reviewed, TIG concludes the following:

- The following three parties contributed the majority of contamination of environmental media at the Property:
 - Mineralized-Cell, with wood preservation and treatment
 - Carlisle, Crown, the U.S. Army, with charcoal and whetlerite manufacturing and testing
 - Reichhold with chemical manufacturing
- Hanson, Ash Grove, and Glacier Northwest's cement storage and distribution operations contributions to contamination at the Property is small compared to the three other parties.

TIG reviewed chemistry data and historical operations to assess whether the distribution of contaminants could be linked to an operational area associated with a known historical operator. TIG determined a total past investigation and remediation cost of \$8,604,890.98 based on counsel-provided consultant, attorney, and regulatory agency invoices.

Overlapping operational areas, contaminants associated with more than one party, distribution of waste by several parties in areas beyond operational areas, and redevelopment activities that moved contaminants from source areas did not allow TIG to assign contamination to one or other historical source. Invoices provided by counsel provided limited detail for cost distribution purposes. As a result, all remaining costs were apportioned with an algorithm that uses standard metrics for estimating liability shares in environmental cost recovery and/or allocations.

TIG's algorithm distributed the total cost between the operators and owners as a percentage of total cost based on the following metrics:

- Exceedance frequencies of each COC based on the number of samples collected during the RI
- Time weighted areas based on the duration of operations and operational area
- Proportion of COC share based on the time weighted area for each operator associated with a COC and the total timeweighted area scores
- Percentage of total cost per COC for each operational period and a total percentage per operator for all applicable COCs
- Scores for operators and owners based on the duration of operations and ownership

After determining the final shares for each owner and operator, Glacier Northwest's allocation of total cost was 1.39 percent, Reichhold's allocation was 27.49 percent, and Hanson's allocation was 1.26 percent. The remaining shares were assigned to non-participating parties.

Given that Hanson was responsible for moving contaminated soil from source areas to other areas of the Property, TIG shifted 15 percent of the Liability Shares assigned to parties predating Hanson's redevelopment to Hanson's original Liability Share share of 1.26 percent, resulting in an adjusted Liability Share of 37.54 percent for Hanson.

Because only Glacier Northwest, Reichhold, and Hanson are participating in the bankruptcy, the Liability Shares assigned to all non-participants was distributed between Glacier Northwest, Reichhold and Hanson.

This leaves 3.52 percent or \$302,771.79 of the total past investigation cost to Glacier Northwest, 58.94 percent, or \$5,071,521.86 of the total past investigation cost to Reichhold, and 37.54 percent, or \$3,230,597.33 of the total past investigation cost to Hanson.

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Tables



Contaminant Class	Contaminant	Total Samples Across Environmental Media	Average ¹ Exceedance Frequency Across Environmental Media (%) ²	Assumed Number of Samples Above Criteria	COC Share
Metals	Arsenic	621	63.73	396	36.19%
Metals	Copper	401	47.93	192	17.58%
Metals	Zinc	395	15.16	60	5.48%
Metals	TBT	395	15.16	60	5.48%
SVOCs ³	PCP	544	36.27	197	18.04%
Total PAHs ⁴	Total PAHs	93	25.50	24	2.17%
Total PCBs ⁵	Total PCBs	86	37.03	32	2.91%
Total PCDD/Fs ⁶	Total PCDD/Fs	163	71.83	117	10.71%
TPH ⁷	Total TPH	74	21.44	16	1.45%
Total				1,094	

¹ An average frequency was calculated from the frequency of exceedance of each media type.

² Typically, cost allocation models use enrichment factors rather than exceedance frequencies. TIG did not use enrichment factors because the use of enrichment factors would have skewed the percent allocations to each COC disproportionately to PCP and PCBs, that is more than 99 percent, due to the low screening levels for these compounds.

³ Additional SVOCs, including 2,4,6-trichlorophenol; 2,4-dichlorophenol; and phenol were identified by ERM as contaminants at the Property; however, the detections of these additional SVOCs were co-located with detections of PCP. Therefore, PCP is considered representative of all SVOCs and TIG used PCP as an indicator compound in its analysis.

⁴ ERM identified individual cPAHs as primary contaminants in environmental media; however, these individual cPAHs were co-located with the soil samples exceeding the TEQ of total cPAHs. Therefore, the magnitude and extent of individual cPAHs can be represented by the total cPAHs. TIG used the average count of samples across media of all PAH compounds and the average detection above screening criteria among PAH compounds for its analysis.

⁵ ERM refers to this value as Total PCB Aroclors in its 2020 Remedial Investigation (RI) report, and TIG used this value as presented.

⁶ TIG used the TEQ for PCDD/Fs as it was presented by ERM in its 2020 RI report.

⁷ TIG used TPH-diesel range as an indicator value for all Site TPH.

Acronyms and Abbreviations

COC: contaminant of concern

cPAH: carcinogenic polycyclic aromatic hydrocarbon

ERM: Environmental Resource Management, Inc.

PAH: polycyclic aromatic hydrocarbon

PCB: polychlorinated biphenyl

PCDD/Fs: polychlorinated dibenzo-p-dioxins and dibenzofurans

PCP: pentachlorophenol

SVOC: semi-volatile organic carbon

TBT: tributyltin

TEQ: toxicity equivalent quotient

TIG: TIG Environmental

TPH: total petroleum hydrocarbons

Operational Period	Associated COCs	Duration (years)	Size (sq. ft.)	Time-Weighted Area Score	Proportion of COC Share								
					Arsenic	Copper	Zinc	TBT	PCP	Total PAHs	Total PCBs	PCDD/Fs	TPH
Onsite Sources													
Mineralized-Cell Wood Preserving Co.	Arsenic, copper, zinc, total PAHs, and TPH	4	371,252	1,485,008	0.73	0.73	0.73	--	--	0.03	--	--	0.03
U.S. Army	Arsenic, copper, zinc, total PAHs, total PCBs, PCDD/Fs, and TPH	4	136,562	546,248	0.27	0.27	0.27	--	--	0.01	0.07	0.09	0.01
Reichhold Chemicals, Inc..	PCP, total PAHs, total PCBs, PCDD/Fs, and TPH	20	268,431	5,368,620	--	--	--	--	1	0.12	0.70	0.91	0.12
Hanson Permanente Cement, Inc.	Total PAHs and TPH	27	598,556	16,161,012	--	--	--	--	--	0.36	--	--	0.36
Ash Grove Cement Company	Total PAHs and TPH	4	598,556	2,394,224	--	--	--	--	--	0.05	--	--	0.05
Glacier Northwest, Inc.	Total PAHs and TPH	29	598,556	17,358,124	--	--	--	--	--	0.39	--	--	0.39
Subtotal - On-property Sources				43,313,236	1	1	1	0	1	0.96	0.77	1	0.96
Neighboring Site Sources													
Duwamish Shipyard, Inc.	TBT, total PAHs, total PCBs, and TPH	None		866,265	--	--	--	1	--	0.02	0.11	--	0.02
Port of Seattle Terminal - 115	Total PAHs, total PCBs, and TPH	None		866,265	--	--	--	--	--	0.02	0.11	--	0.02
Subtotal - Neighboring Property Sources				1,732,529.44	--	--	--	--	--	0.04	0.22	--	0.04
Grand Total				45,045,765	1	1	1	1	1	1	1	1	1

Acronyms and Abbreviations

COC: contaminant of concern
Mineralized-Cell:
PAH: polycyclic aromatic hydrocarbon
PCB: polychlorinated biphenyl
PCDD/Fs: polychlorinated dibenzo-p-dioxins and dibenzofurans
PCP: pentachlorophenol
TBT: tributyltin
TPH: total petroleum hydrocarbons

Period	Percentage of Total Cost									Percentage of Total Cost
	Arsenic	Copper	Zinc	TBT	PCP	Total PAHs	Total PCBs	Total PCDD/Fs	TPH	
Mineralized- Cell Wood Preserving Co.	26.46%	12.85%	4.00%	--	--	0.07%	--	--	0.05%	43.43%
U.S. Army	9.73%	4.73%	1.47%	--	--	0.03%	0.21%	0.99%	0.02%	17.17%
Reichhold Chemicals, Inc.	--	--	--	--	18.04%	0.26%	2.04%	9.72%	0.17%	30.23%
Hanson Permanente Cement, Inc.	--	--	--	--	--	0.78%	--	--	0.52%	1.30%
Ash Grove Cement Company	--	--	--	--	--	0.12%	--	--	0.08%	0.19%
Glacier Northwest, Inc.	--	--	--	--	--	0.84%	--	--	0.56%	1.39%
Duamish Shipyard, Inc.	--	--	--	5.48%	--	0.04%	0.33%	--	0.03%	5.88%
Port of Seattle - Terminal 115	--	--	--	--	--	0.04%	0.33%	--	0.03%	0.40%

Acronyms and Abbreviations

PAH: polycyclic aromatic hydrocarbon

PCB: polychlorinated biphenyl

PCDD/Fs: polychlorinated dibenzo-p-dioxins and dibenzofurans

PCP: pentachlorophenol

TBT: tributyltin

TEQ: toxicity equivalent quotient

TPH: total petroleum hydrocarbons

Operational Period	Party	Duration of Involvement (years)	Role	Portion of Responsibility for Each Operational Period							
				Mineralized-Cell Wood Preserving Co.	U.S. Army	Reichhold Chemicals Co.	Hanson Permanente Cement, Inc.	Ash Grove Cement Company	Glacier Northwest, Inc.	Duwamish Shipyard, Inc.	Port of Seattle Terminal 115
Mineralized-Cell Wood Preserving Co.	King County	4	Owner	0.091	--	--	--	--	--	--	--
	Mineralized Cell Wood Preserving Co.	4	Operator	0.909	--	--	--	--	--	--	--
U.S. Army	U.S. Army ¹	4	Operator	--	0.902	--	--	--	--	--	--
	King County	2	Owner	--	0.045	--	--	--	--	--	--
	Carlisle Lumber Co.	0.33	Owner	--	0.007	--	--	--	--	--	--
	U.S. Government	2	Owner	--	0.045	--	--	--	--	--	--
Reichhold Chemicals, Inc.	Reichhold	20	Operator	--	--	0.909	--	--	--	--	--
	U.S. Government	20	Owner	--	--	0.091	--	--	--	--	--
Hanson Permanente Cement, Inc.	Hanson Permanente, Inc.	27	Operator	--	--	--	0.968	--	--	--	--
	Port of Seattle	9	Owner	--	--	--	0.032	--	--	--	--
Ash Grove Cement Company	Ash Grove Cement Company	4	Owner	--	--	--	--	0.909	--	--	--
	Lone Star Industries/Lone Star Northwest	4	Operator	--	--	--	--	0.091	--	--	--
Glacier Northwest, Inc.	Glacier Northwest, Inc.	29	Operator	--	--	--	--	--	1.000	--	--
Duwamish Shipyard, Inc.	Duwamish Shipyard, Inc.	--	Operator	--	--	--	--	--	--	1.000	--
Port of Seattle - Terminal 115	Port of Seattle	--	Owner	--	--	--	--	--	--	--	1.000
			Total	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

¹ For the purposes of this report, the U.S Army, Carlisle Lumber Co. and Crown Zellerbach were considered one operator.

Party	Responsibility for Total Allocation to Each Owner and Operator								Liability Share for All Operational Periods
	Mineralized-Cell Wood Preserving Co.	U.S. Army	Reichhold Chemicals, Inc.	Hanson Permanente Cement, Inc.	Ash Grove Cement Company	Glacier Northwest, Inc.	Duwamish Shipyard, Inc.	Port of Seattle Terminal 115	
Mineralized-Cell Wood Preserving Co.	39.48%	--	--	--	--	--	--	--	39.48%
Reichhold Chemicals, Inc.	--	--	27.49%	--	--	--	--	--	27.49%
U.S. Army ¹	--	15.50%	--	--	--	--	--	--	15.50%
Duwamish Shipyard, Inc.	--	--	--	--	--	--	5.88%	--	5.88%
King County	3.95%	0.77%	--	--	--	--	--	--	4.72%
U.S. Government	--	0.77%	2.75%	--	--	--	--	--	3.52%
Glacier Northwest, Inc.	--	--	--	--	--	1.39%	--	--	1.39%
Hanson Permanente Cement, Inc.	--	--	--	1.26%	--	--	--	--	1.26%
Port of Seattle	--	--	--	0.04%	--	--	--	0.40%	0.44%
Ash Grove Cement Company	--	--	--	--	0.17%	--	--	--	0.17%
Carlisle Lumber Company	--	0.13%	--	--	--	--	--	--	0.13%
Lone Star Industries/Lone Star Northwest	--	--	--	--	0.02%	--	--	--	0.02%
Total	43.43%	17.17%	30.23%	1.30%	0.19%	1.39%	5.88%	0.40%	100.00%

¹ For the purposes of this report, the U.S Army, Carlisle Lumber Co. and Crown Zellerbach were considered one operator

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**Table 6: Account for Exacerbation of Existing Contamination
and Reallocate Costs between Remaining Liable Parties**

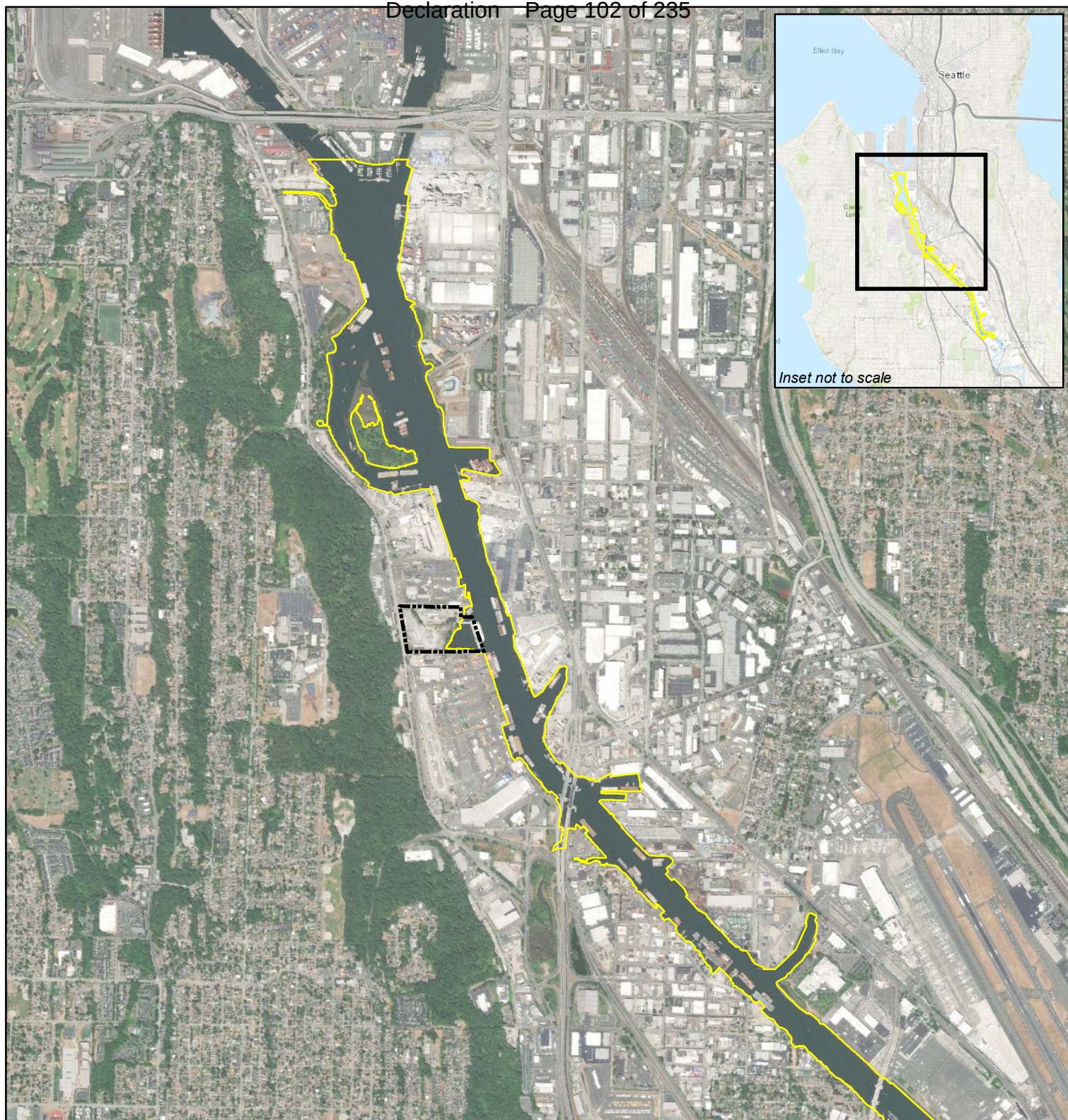
Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Party	Liability Share from Step 5	Reallocation of 15% of Orphan Shares Predating Hanson	Adjusted Shares Including 15% Reallocation for All Parties	Final Shares to Glacier Northwest, Reichhold, and Hanson	Total Cost
Mineralized Cell Wood Treatment Company	39.48%	-5.92%	33.56%		
Reichhold Chemicals, Inc.	27.49%	-4.12%	23.36%	58.94%	\$5,071,521.86
U.S. Army	15.50%	-2.32%	13.17%		
King County	4.72%	-0.71%	4.01%		
U.S. Government	3.52%	-0.53%	2.99%		
Carlisle Lumber Company	0.13%	-0.02%	0.11%		
Duwamish Shipyard, Inc.	5.88%	--	5.88%		
Port of Seattle Terminal 115	0.44%	--	0.44%		
Ash Grove Cement, Inc.	0.17%	--	0.17%		
Lone Star Industries/Lone Star Northwest	0.02%	--	0.02%		
Glacier Northwest, Inc.	1.39%	--	1.39%	3.52%	\$302,771.79
Hanson Permanente Cement, Inc.	1.26%	+13.63%	14.88%	37.54%	\$3,230,597.33
Total from Parties Predating Hanson ¹	90.84%				



¹ The shaded parties predate Hanson. Offsite parties were not included in the reallocation of orphan shares predating Hanson.

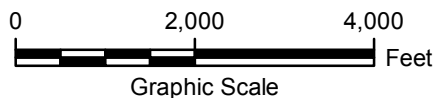
Figures





Legend:

-  Current property boundary
-  Lower Duwamish Waterway Superfund Study Area



Notes:

1. 2018 aerial and topographic basemap provided by ESRI imagery services (accessed May 2020).



Figure 1: Property Location

Evaluation of Liability for Investigation and Remediation Costs at Glacier Northwest Property

Glacier Northwest, Inc.



Exhibit 3 Page 149

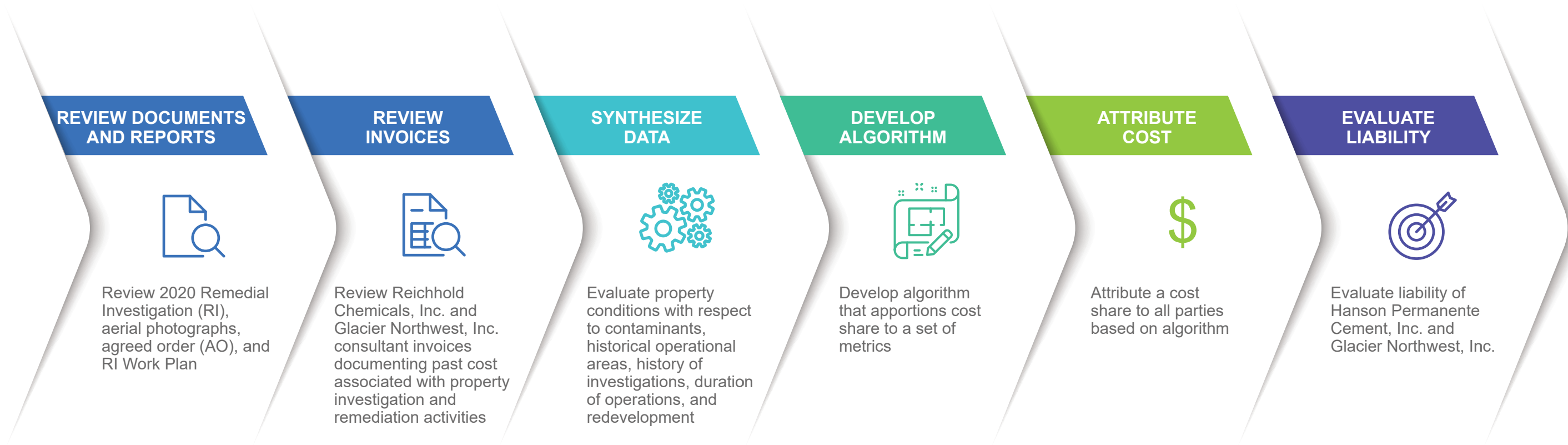


Figure 2: Methodology Flow Chart

Evaluation of Liability for Investigations and Remediation Costs at Glacier Northwest Property

Glacier Northwest, Inc.





Legend:

Former Carlisle Lumber Company/Crown Zellerbach Co./U.S. Army operational area

Former Mineralized Cell Wood Preserving Company operational area

Notes:

1. 2018 aerial and topographic basemap provided by ESRI imagery services (accessed May 2020).

2. King County parcel boundaries obtained from King County GIS Data Hub (last updated April 2020).

0150300

Feet

Graphic Scale



Figure 3: Historical Operational Areas

Evaluation of Liability for Investigation and Remediation Costs at Glacier Northwest Property

Glacier Northwest, Inc.

G:\InfoGraphics\Veris\NW Glacier\NWGlacier_Timeline_v3.ai Date modified: 5/19/2020 Modified by: jfredenburg

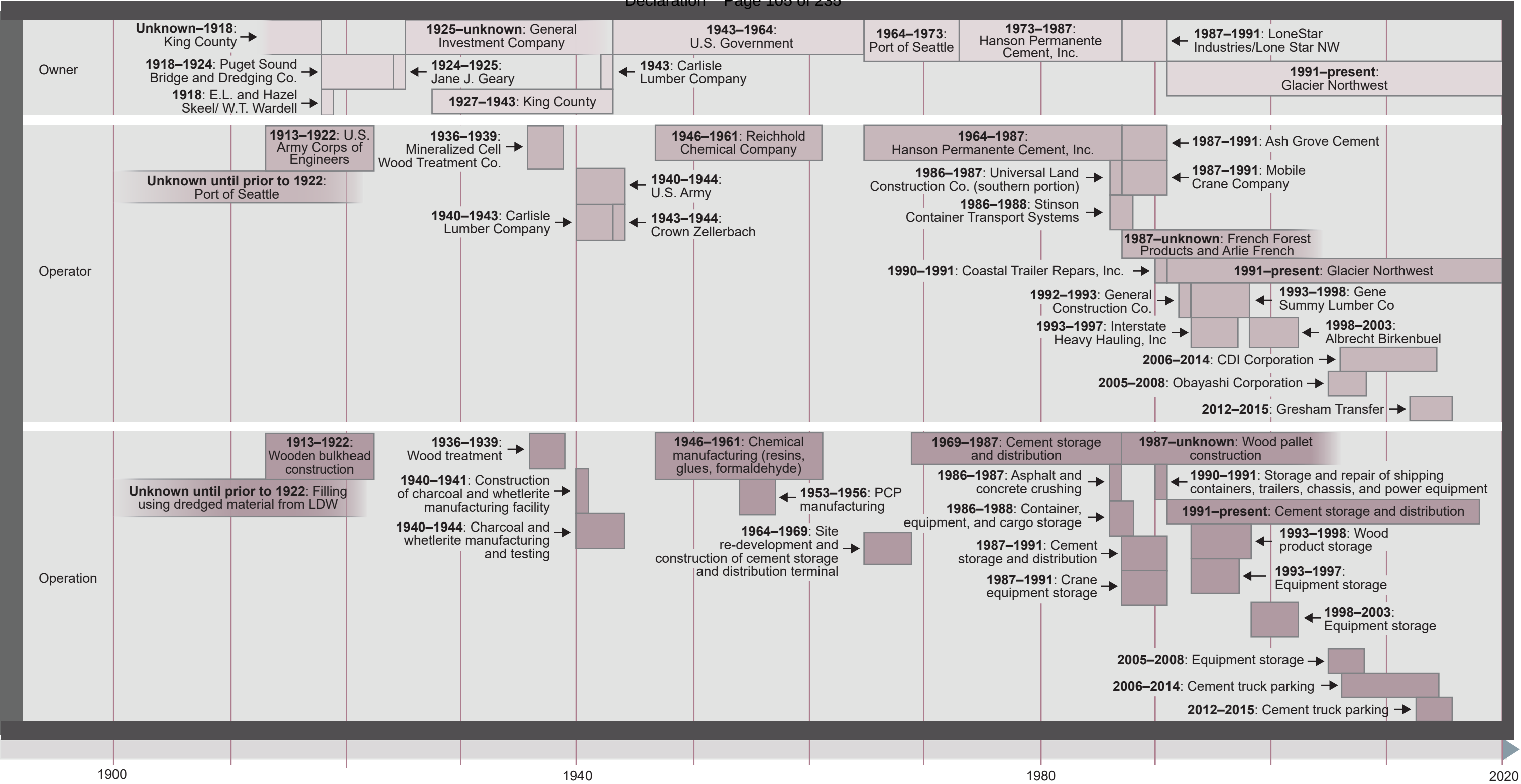


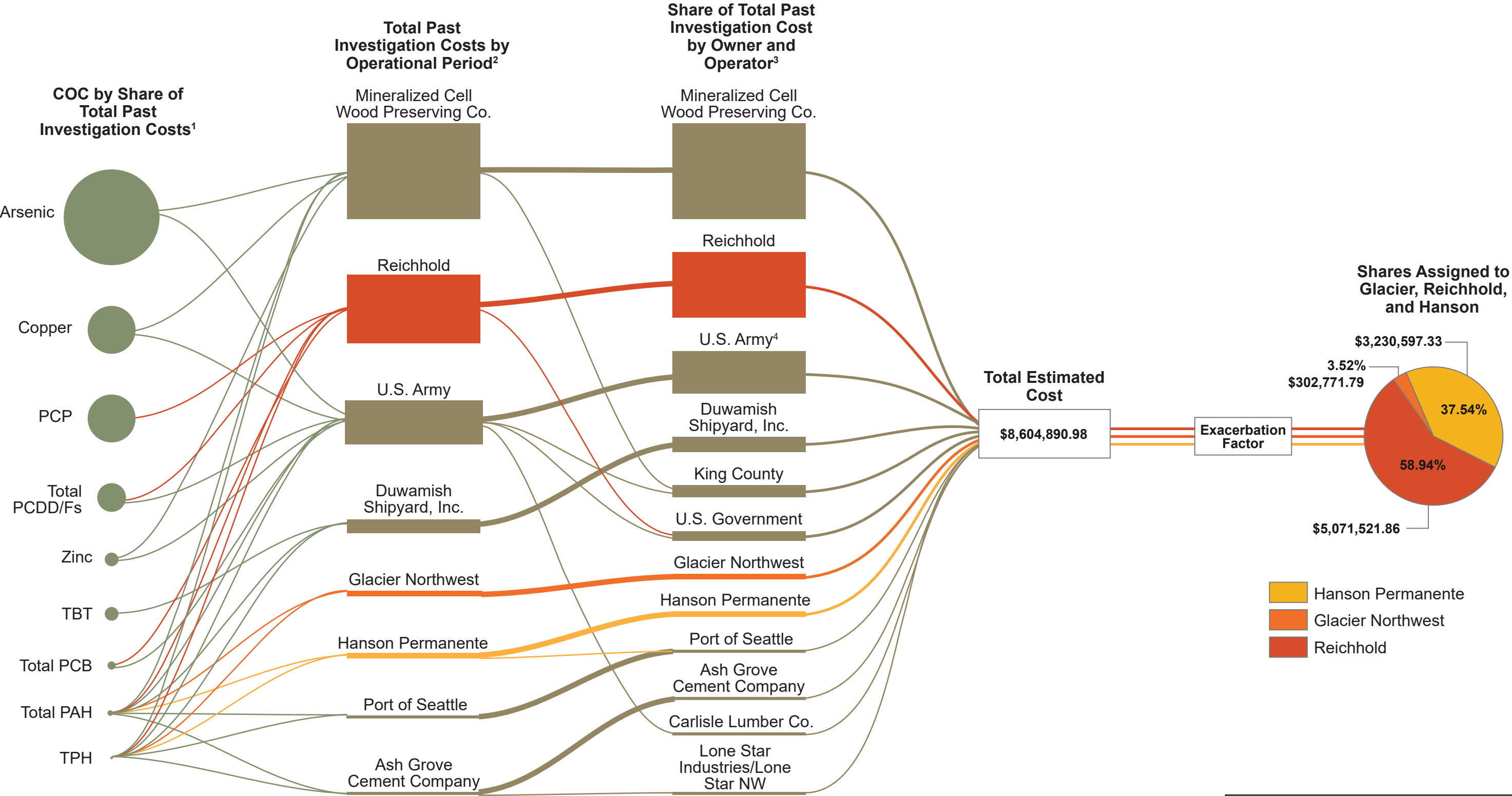
Figure 4: Timeline of Owners, Operators, and Operations

Evaluation of Liability for Investigation and Remediation Costs at Glacier Northwest Property

Glacier Northwest, Inc.



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Footnotes:

1. The weighting of COCs is summarized in the main text section 6.2.1 and Table 1. The COC weight was assigned by dividing the number of samples that exceeded the screening level for a specific COC by the total number of samples that exceeded screening levels for all COCs.
2. The total past investigation cost by operational period is summarized in main text 6.2.4 and Table 3. The shares of the total past cost were assigned to each operational period by dividing the time weighted average of each operational period by the total time weighted averages of all operational periods associated with a given COC.
3. The share of total past investigation costs assigned to each owner and operator are summarized in the main text section 6.2.5 and Table 5. The share of total past costs assigned to each owner and operator was assigned by giving the operator ten times the responsibility for costs as the owner.
4. For the purposes of this report, the U.S Army, Carlisle Lumber Co. and Crown Zellerbach were considered one operator.

Figure 5: Cost Algorithm Conceptual Model

Evaluation of Liability for Investigation and Remediation Costs at Glacier Northwest Property

Glacier Northwest, Inc.

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environmental
EXHIBIT 3 Page 46 of 149

Appendix A

Compilation of Documents Reviewed by TIG

This appendix is provided separately



Appendix B

Summary of Costs





Table B1: Summary of Costs
Evaluation of Liability for Past Investigation and
Remediation Costs at the Glacier Northwest Property

Total Cost	Years of Services	Costs per invoices
ERM	June 2009–April 2020	\$4,854,108.50
RETEC	January 1996–October 1996	\$102,918.15
IT Corp	October 1998– December 2000	\$368,108.15
Shaw	July 2008–November 2008	\$203,072.19
Fluor Daniel-GTI	September 1997–October 1998	\$70,725.04
Ecology	October 2009–March 2019	\$723,849.23
CH2MHill	December 2007–November 2014	\$542,680.93
Anchor QEA	March 2015–March 2020	\$138,600.14
Preston Gates Ellis	January 1991–November 1993	\$24,331.66
Perkins Coie	November 2003–February 2010	\$301,524.55
Ater Wynne	October 2008–October 2014	\$976,060.16
Veris Law Group	August 2012–March 2020	\$298,912.28
Total costs		\$8,604,890.98



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Table B2: ERM Invoice Summary

Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services Invoiced
32624	5/7/2020	ERM	Glacier	4/1/20–4/30/20	\$93,114.20	RI
32260	4/6/2020	ERM	Glacier	2/29/2020–3/31/2020	\$3,040.50	Project Management
					\$395.50	Regulatory Negotiations and Meetings
					\$616.00	Treatability Testing and Analyses
					\$102.00	Treatability Testing Results
					\$52,506.25	Draft Feasibility Study
					\$56,660.25	
32112	3/16/2020	ERM	Glacier	7/2/2019–2/28/2020	\$11,444.50	Project Management
					\$12,032.00	Regulatory Negotiations and Meetings
					\$19,349.80	Treatability Testing and Analyses
					\$1,648.50	Treatability Testing Results
					\$11,055.50	Preparation of Cleanup Level Memorandum
					\$44,426.50	Remedial Investigation Report Revision
					\$41,908.00	Draft Feasibility Study
					\$141,864.80	
31784	2/17/2020	ERM	Glacier	11/25/2019–1/25/2019	\$7,962.50	Regulatory Negotiations and Meetings
					\$449.40	Lab Archive Samples Storage Fees
					\$13,642.96	Treatability Testing and Analyses
					\$16,043.50	Remedial Investigation Report Revision
					\$41,345.75	Draft Feasibility Study
					\$79,444.11	
31282	12/20/2019	ERM	Glacier	9/29/2019–11/22/2019	\$1,607.50	Project Management
					\$554.00	Regulatory Negotiations and Meetings
					\$308.00	Adjacent Site Document Reviews
					\$898.80	Lab Archive Samples Storage Fees
					-\$464.38	Treatability Testing and Analyses
					\$485.50	Treatability Testing Results
					\$21,551.75	Remedial Investigation Report Revision
					\$21,099.00	Draft Feasibility Study
					\$46,040.17	
30904	11/11/2019	ERM	Glacier	7/27/2019–9/28/2019	\$8,077.00	Project Management
					\$7,378.50	Regulatory Negotiations and Meetings
					\$396.00	Adjacent Site Document Reviews
					\$2,763.57	Treatability Testing and Analyses
					\$4,002.00	Data Gaps Investigation



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Table B2: ERM Invoice Summary

Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services Invoiced
					\$5,234.00	Remedial Technologies and Remedial Alternatives Tables
					\$49,168.28	Remedial Investigation Report Revision
					\$29,556.65	Draft Feasibility Study
					\$106,576.00	
30420	9/27/2019	ERM	Glacier	5/25/2019–7/26/2019	\$3,970.50	Project Management
					\$3,462.00	Regulatory Negotiations and Meetings
					\$10,997.98	Treatability Testing and Analyses
					\$26,991.10	Data Gaps Investigation
					\$9,561.50	Remedial Technologies and Remedial Alternatives Tables
					\$7,645.00	Remedial Investigation Report Revision
					\$4,063.00	Draft Feasibility Study
					\$66,691.08	
30032	8/13/2019	ERM	Glacier	5/25/2019–7/26/2019	\$6,276.50	Project Management
					\$3,888.00	Regulatory Negotiations and Meetings
					\$346.00	Adjacent Site Document Reviews
					\$449.40	Lab Archive Samples Storage Fees
					\$9,949.88	Treatability Testing and Analyses
					\$20,863.02	Data Gaps Investigation
					\$12,729.00	Preparation of Cleanup Level Memorandum
					\$4,796.50	Remedial Technologies and Remedial Alternatives Tables
					\$15,226.50	Remedial Investigation Report Revision
					\$20,417.50	Draft Feasibility Study
					\$94,942.30	



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Table B2: ERM Invoice Summary

Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services Invoiced
29513	7/1/2019	ERM	Glacier	4/28/2019–5/24/2019	\$3,557.94	Project Management
					\$343.50	Regulatory Negotiations and Meetings
					\$143.00	Adjacent Site Document Reviews
					\$1,142.76	Lab Archive Samples Storage Fees
					\$23,080.89	Treatability Study Sample Collection
					\$32,797.81	Data Gaps Investigation
					\$132.00	Preparation of Cleanup Level Memorandum
					\$6,244.50	Remedial Investigation Report Revision
					\$12,690.50	Draft Feasibility Study
					\$80,132.90	
28997	5/10/2019	ERM	Glacier	2/24/2019–4/27/2019	\$3,772.00	Project Management
					\$858.00	Regulatory Negotiations and Meetings
					\$743.50	Adjacent Site Document Reviews
					\$844.50	Treatability Study Sample Collection
					\$5,647.50	Data Gaps Investigation
					\$364.00	Preparation of Cleanup Level Memorandum
					\$19,262.00	Remedial Investigation Report Revision
					\$426.00	Draft Feasibility Study
					\$31,917.50	
28296	3/11/2019	ERM	Glacier	1/5/2019–2/23/2019	\$1,433.50	Project Management
					\$765.50	Regulatory Negotiations and Meetings
					\$1,122.32	Laboratory Archive Sample Storage Fees
					\$1,777.50	Preparation of Cleanup Level Memorandum
					\$4,814.50	Remedial Investigation Report Revision
					\$9,913.32	
27803	1/30/2019	ERM	Glacier	10/28/2018–1/4/2019	\$3,247.50	Project Management
					\$580.50	Regulatory Negotiations and Meetings
					\$545.00	Adjacent Site Document Reviews
					\$1,029.82	Laboratory Archive Sample Storage Fees
					\$5,402.82	
27009	11/14/2018	ERM	Glacier	9/30/2018–10/27/2018	\$277.50	Regulatory Negotiations and Meetings
					\$4,686.00	Draft and Final Treatability SWP
					\$4,963.50	



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Table B2: ERM Invoice Summary

Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced
26678	10/18/2019	ERM	Glacier	9/8/2018–9/29/2018	\$1,958.50	Project Management
					\$673.00	Regulatory Negotiations and Meetings
					\$2,280.00	Draft and Final Treatability SWP
					\$4,911.50	
25760	8/8/2018	ERM	Glacier	5/27/2018–7/28/2018	\$4,190.44	Project Management
					\$2,203.00	Regulatory Negotiations and Meetings
					\$550.00	Adjacent Sites Document Reviews
					\$937.32	Laboratory Archive Sample Storage
					\$11,075.50	Data Gaps Investigation Work Plan
					\$18,956.26	
25079	6/12/2018	ERM	Glacier	4/1/2018–5/26/2018	\$658.75	Project Management
					\$858.00	Regulatory Negotiations and Meetings
					\$937.32	Laboratory Archive Sample Storage
					\$2,454.07	
24198	4/6/2018	ERM	Glacier	2/25/2018–3/31/2018	\$1,024.00	Project Management
					\$5,899.00	Regulatory Negotiations and Meetings
					\$347.50	Groundwater Level Measurements
					\$1,485.00	Adjacent Site Document Reviews
					\$92.50	Laboratory Archive Sample Storage
					\$16,879.00	Ecology Comments on the Draft RI Report
					\$25,727.00	
24112	3/26/2018	ERM	Glacier	11/26/2017–2/24/2018	\$2,976.00	Project Management
					\$4,115.00	Regulatory Negotiations and Meetings
					\$4,264.01	Groundwater Level Measurements
					\$6,990.00	Adjacent Site Document Reviews
					\$2,545.80	Laboratory Archive Sample Storage
					\$19,251.00	Ecology Comments on the Draft RI Report
					\$40,141.81	
22758	12/8/2017	ERM	Glacier	10/1/2017–11/2/2017	\$319.00	Project Management
					\$488.00	Regulatory Negotiations and Meetings
					\$175.00	Groundwater Level Measurements
					\$370.00	Adjacent Site Document Reviews
					\$1,405.98	Laboratory Archive Sample Storage
					\$2,757.98	



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Table B2: ERM Invoice Summary

Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced
22171	10/20/2017	ERM	Glacier	8/27/2017–9/30/2017	\$319.00	Project Management
					\$185.00	Regulatory Negotiations and Meetings
					\$1,957.00	Groundwater Level Measurements
					\$2,461.00	
21733	9/15/2017	ERM	Glacier	7/2/2017–8/26/2017	\$411.50	Project Management
					\$462.50	Regulatory Negotiations and Meetings
					\$3,010.00	Groundwater Level Measurements
					\$282.00	Adjacent Site Document Reviews
					\$1,405.98	Laboratory Archive Sample Storage
					\$5,571.98	
21031	8/19/2017	ERM	Glacier	4/30/2017–7/1/2017	\$1,480.44	Project Management
					\$488.00	Regulatory Negotiations and Meetings
					\$370.00	Adjacent Site Document Reviews
					\$2,338.44	
20191	5/16/2017	ERM	Glacier	1/1/2017–4/29/2017	\$1,295.00	Project Management
					\$3,374.00	Regulatory Negotiations and Meetings
					\$6,431.84	Quarterly Groundwater Level Measurements
					\$411.50	Adjacent Site Document Reviews
					\$2,811.96	Laboratory Archive Sample Storage
					\$14,324.30	
106071	1/23/2017	ERM	Glacier	10/30/2016–12/31/2016	\$2,150.50	Project Management
					\$3,231.00	Regulatory Negotiations and Meetings
					\$1,748.25	Quarterly Groundwater Level Measurements
					\$370.00	Adjacent Site Document Reviews
					\$7,499.75	
104000	11/7/2016	ERM	Glacier	10/2/2016–10/29/2016	\$370.00	Project Management
					\$277.50	Regulatory Negotiations and Meetings
					\$288.00	Quarterly Groundwater Level Measurements
					\$1,405.98	Laboratory Archive Sample Storage
					\$2,341.48	
103509	10/31/2016	ERM	Glacier	8/28/2016–10/1/2016	\$976.00	Project Management
					\$277.50	Regulatory Negotiations and Meetings
					\$1,253.50	



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Table B2: ERM Invoice Summary

Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services Invoiced
101573	8/12/2016	ERM	Glacier	5/29/2016–7/30/2016	\$555.00	Project Management
					\$555.00	Regulatory Negotiations and Meetings
					\$3,411.02	Quarterly Groundwater Level Measurements
					\$370.00	Adjacent Sites Document Reviews
					\$1,405.98	Laboratory Archive Sample Storage
					\$6,297.00	
102476	9/13/2016	ERM	Glacier	7/31/2016–8/27/2016	\$555.00	Project Management
					\$185.00	Regulatory Negotiations and Meetings
					\$978.50	Quarterly Groundwater Level Measurements
					\$1,718.50	
99388	6/6/2016	ERM	Glacier	4/29/2016–5/28/2016	\$922.50	Project Management
					\$277.50	Regulatory Negotiations and Meetings
					\$837.50	Quarterly Groundwater Level Measurements
					\$2,037.50	
98662	11/7/2016	ERM	Glacier	2/29/2016–4/30/2016	\$1,464.00	Project Management
					\$1,674.50	Regulatory Negotiations and Meetings
					\$3,321.00	Quarterly Groundwater Level Measurements
					\$1,405.98	Laboratory Archive Sample Storage
					\$7,865.48	
44936B	10/7/2011	ERM	75% Reichhold 25% Glacier	8/28/2011–10/1/2011	\$22,197.08	Project Management and Regulatory Communications
					\$1,374.00	Adjacent Sites Document Reviews
					\$21,522.00	Finalize RI/FS Work Plan
					\$741.12	Spring 2011 Groundwater Sampling
					\$45,834.20	
45930B	11/14/2011	ERM	75% Reichhold 25% Glacier	10/2/2011–10/29/2011	\$7,954.60	Project Management and Regulatory Communications
					\$551.00	Quarterly Groundwater Level Measurements
					-\$9.00	Adjacent Sites Document Reviews
					\$11,271.00	Finalize RI/FS Work Plan
					\$6,943.30	Monitoring Well Installation, Development and Survey
					\$1,809.00	Fall 2011 Groundwater Sampling
					\$28,519.90	



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Table B2: ERM Invoice Summary

Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services Invoiced
47104B	12/15/2011	ERM	75% Reichhold 25% Glacier	10/2/2011–10/29/2011	\$22,836.56	Project Management and Regulatory Communications
					\$429.00	Quarterly Groundwater Level Measurements
					\$60,469.09	Monitoring Well Installation, Development and Survey
					--	Finalize RI/FS Work Plan
					\$12,015.75	Fall 2011 Groundwater Sampling
					\$1,764.00	Storm Water Abandonment Plan
					\$97,514.40	
48190B	1/27/2012	ERM	75% Reichhold 25% Glacier	12/2/2011–1/6/2012	\$7,307.55	Project Management and Regulatory Communications
					\$385.55	Quarterly Groundwater Level Measurements
					\$840.00	Adjacent Site Document Reviews
					\$30,863.25	Monitoring Well Installation, Development and Survey
					\$62,826.30	Fall 2011 Groundwater Sampling
					\$102,222.65	
40342B	4/20/2011	ERM	75% Reichhold 25% Glacier	1/29/2011–4/1/2011	\$25,772.46	Project Management and Regulatory Communications
					\$2,273.50	Quarterly Groundwater Level Measurements
					\$8,784.50	Adjacent Site Document Reviews
					\$1,002.50	Spring 2011 Groundwater Sampling
					\$37,832.96	
40666B	5/9/2011	ERM	75% Reichhold 25% Glacier	4/2/2011–4/30/2011	\$9,664.24	Project Management and Regulatory Communications
					\$1,304.50	Quarterly Groundwater Level Measurements
					\$210.00	Adjacent Site Document Reviews
					\$15,496.08	Spring 2011 Groundwater Sampling
					\$26,674.82	
41671B	6/10/2011	ERM	75% Reichhold 25% Glacier	5/1/2011–5/28/2011	\$10,479.50	Project Management and Regulatory Communications
					\$972.00	Quarterly Groundwater Level Measurements
					\$2,016.00	Adjacent Site Document Reviews
					\$5,445.02	Spring 2011 Groundwater Sampling
					\$18,912.52	



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Table B2: ERM Invoice Summary

Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services Invoiced
42583B	7/14/2011	ERM	75% Reichhold 25% Glacier	5/29/2011–7/2/2011	\$10,372.29	Project Management and Regulatory Communications
					\$81.00	Quarterly Groundwater Level Measurements
					\$882.00	Adjacent Site Document Reviews
					\$26,636.26	Spring 2011 Groundwater Sampling
					\$37,971.55	
43588B	8/12/2011	ERM	75% Reichhold 25% Glacier	7/3/2011–7/31/2011	\$7,437.00	Project Management and Regulatory Communications
					\$1,156.00	Quarterly Groundwater Level Measurements
					\$6,090.00	Finalize RI/FS Work Plan
					\$3,520.67	Spring 2011 Groundwater Sampling
					\$18,203.67	
44345B	9/9/2011	ERM	75% Reichhold 25% Glacier	7/31/2011–8/27/2011	\$10,584.00	Project Management and Regulatory Communications
					\$1,303.50	Quarterly Groundwater Level Measurements
					\$4,377.00	Finalize RI/FS Work Plan
					\$5,699.02	Spring 2011 Groundwater Sampling
					\$21,963.52	
30972B	3/8/2010	ERM	75% Reichhold 25% Glacier	1/24/2010–2/20/2010	\$14,435.95	Project Management and Regulatory Communications
					\$2,381.70	Quarterly Groundwater Level Measurements
					\$2,284.00	Adjacent Site Document Reviews
					\$19,101.65	
31815B	4/14/2010	ERM	75% Reichhold 25% Glacier	2/21/2010–3/31/2010	\$15,486.00	Project Management and Regulatory Communications
					\$291.00	Quarterly Groundwater Level Measurements
					\$292.50	Adjacent Site Document Reviews
					\$806.50	RI/FS WP/SAP Outline
					\$16,876.00	
32277B	5/7/2010	ERM	75% Reichhold 25% Glacier	4/1/2010–4/24/2010	\$3,145.87	Project Management and Regulatory Communications
					\$592.00	Quarterly Groundwater Level Measurements
					\$2,861.00	RI/FS WP/SAP Outline
					\$7,018.13	Spring 2010 Groundwater Sampling
					\$13,617.00	
32775B	6/4/2010	ERM	75% Reichhold 25% Glacier	4/25/2010–5/22/2010	\$4,807.50	Project Management and Regulatory Communications
					\$1,650.50	Quarterly Groundwater Level Measurements
					\$585.00	Adjacent Site Document Reviews



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Table B2: ERM Invoice Summary

Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services Invoiced
					\$40,866.66	Spring 2010 Groundwater Sampling
					\$47,909.66	
33321B	7/13/2010	ERM	75% Reichhold 25% Glacier	5/23/2010–6/26/2010	\$5,704.50	Project Management and Regulatory Communications
					\$145.50	Quarterly Groundwater Level Measurements
					\$1,072.50	Adjacent Site Document Reviews
					\$13,065.52	Spring 2010 Groundwater Sampling
					\$19,988.02	
34127B	8/19/2010	ERM	75% Reichhold 25% Glacier	6/27/2010–7/24/2010	\$16,858.00	Project Management and Regulatory Communications
					\$195.00	RI/FS WP/SAP Outline
					\$2,193.00	Spring 2010 Groundwater Sampling
					\$19,246.00	
34687B	9/20/2010	ERM	75% Reichhold 25% Glacier	7/28/2010–8/21/2010	\$12,768.78	Project Management and Regulatory Communications
					\$984.50	Quarterly Groundwater Level Measurements
					\$975.00	Adjacent Sites Document Reviews
					\$1,011.00	RI/FS WP/SAP Outline
					\$2,838.00	Spring 2010 Groundwater Sampling
					\$18,577.28	
35392B	10/22/2010	ERM	75% Reichhold 25% Glacier	8/22/2010–9/25/2010	\$17,116.00	Project Management and Regulatory Communications
					\$776.00	Quarterly Groundwater Level Measurements
					\$3,510.00	Adjacent Sites Document Reviews
					\$7,763.50	RI/FS WP/SAP Outline
					\$797.46	Fall 2010 Groundwater Sampling
					\$6,305.00	Draft RI/FS Work Plan and Project Plans
					\$36,430.52	



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Table B2: ERM Invoice Summary

Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services Invoiced
36023B	11/18/2010	ERM	75% Reichhold 25% Glacier	9/26/2010–10/23/2010	\$14,262.70	Project Management and Regulatory Communications
					\$115.00	Quarterly Groundwater Level Measurements
					\$1,710.00	Adjacent Sites Document Reviews
					\$5,626.19	Fall 2010 Groundwater Sampling
					\$28,307.00	Draft RI/FS Work Plan and Project Plans
					\$50,020.89	
36332B	12/8/2010	ERM	75% Reichhold 25% Glacier	10/24/2010–11/20/2010	\$18,444.06	Project Management and Regulatory Communications
					\$964.00	Quarterly Groundwater Level Measurements
					\$2,500.00	Adjacent Sites Document Reviews
					\$14,412.31	Fall 2010 Groundwater Sampling
					\$13,948.50	Draft RI/FS Work Plan and Project Plans
					\$50,268.87	
37231B	1/21/2011	ERM	75% Reichhold 25% Glacier	11/21/2010–12/25/2010	\$7,099.55	Project Management and Regulatory Communications
					\$543.00	Quarterly Groundwater Level Measurements
					\$1,800.00	Adjacent Sites Document Reviews
					\$30,623.95	Fall 2010 Groundwater Sampling
					\$40,066.50	
38502B	2/16/2011	ERM	75% Reichhold 25% Glacier	12/26/2010–1/28/2011	\$11,022.50	Project Management and Regulatory Communications
					\$2,255.98	Quarterly Groundwater Level Measurements
					\$13,278.48	
27751B	7/10/2009	ERM	75% Reichhold 25% Glacier	5/24/2009–6/27/2009	\$2,851.07	Pre-Sampling/Field Activities
					\$2,955.00	Agreed Order Negotiations
					\$3,245.81	Assessment of Site Development/History
					\$2,461.00	Groundwater Sampling and Analysis
					\$5,905.00	Supplemental Data Gaps Report
					\$6,517.50	GIS Database Development
					\$16,577.87	Project Management and Regulatory Communications



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Table B2: ERM Invoice Summary

Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced
					\$1,592.00	Quarterly Groundwater Measurements
					\$378.00	Storm Sewer System Location
					\$42,483.25	
28263B	8/12/2009	ERM	75% Reichhold 25% Glacier	6/28/2009–7/25/2009	\$195.00	Agreed Order Negotiations
					\$2,782.50	Assessment of Site Development/History
					\$3,447.50	Groundwater Sampling and Analysis
					\$6,088.00	Supplemental Data Gaps Report
					\$387.00	GIS Database Development
					\$9,585.07	Project Management and Regulatory Communications
					\$465.50	Storm Sewer System Location
					\$22,950.57	
28642B	9/4/2009	ERM	75% Reichhold 25% Glacier	7/26/2009–8/22/2009	\$1,080.00	Agreed Order Negotiations
					\$7,906.50	Assessment of Site Development/History
					\$3,420.04	Groundwater Sampling and Analysis
					\$12,788.50	Supplemental Data Gaps Report
					\$3,800.50	GIS Database Development
					\$15,052.15	Project Management and Regulatory Communications
					\$4,855.47	Storm Sewer System Location
					\$48,903.16	
29120B	10/9/2009	ERM	75% Reichhold 25% Glacier	8/23/2009–9/26/2009	\$43.80	Pre-Sampling Field Activities
					\$8,899.48	Assessment of Site Development/History
					\$22,509.00	Supplemental Data Gaps Report
					\$2,185.00	GIS Database Development
					\$20,530.69	Project Management and Regulatory Communications
					\$867.45	Storm Sewer System Location
					\$2,180.00	Adjacent Sites Document Reviews
					\$57,215.42	



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Table B2: ERM Invoice Summary

Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services Invoiced
29491B	11/9/2009	ERM	75% Reichhold 25% Glacier	9/27/2009–10/24/2009	\$797.43	Pre-Sampling Field Activities
					\$15,120.50	Supplemental Data Gaps Report
					\$11,117.59	Project Management and Regulatory Communications
					\$1,828.38	Quarterly Groundwater Level Measurements
					\$10,919.08	Storm Sewer System Location
					\$2,766.50	Adjacent Sites Document Reviews
					\$42,549.48	
29854B	12/8/2009	ERM	75% Reichhold 25% Glacier	10/25/2009–11/21/2009	\$9,296.68	Supplemental Data Gaps Report
					\$17,987.50	Project Management and Regulatory Communications
					\$966.49	Quarterly Groundwater Level Measurements
					\$1,030.00	Storm Sewer System Location
					\$1,802.00	Adjacent Sites Document Reviews
					\$31,082.67	
30060B	12/30/2009	ERM	75% Reichhold 25% Glacier	11/22/2009–12/26/2009	\$187.65	Pre-Sampling Field Activities
					\$7,563.00	Project Management and Regulatory Communications
					\$417.50	Quarterly Groundwater Level Measurements
					\$86.00	Storm Sewer System Location
					\$272.00	Adjacent Sites Document Reviews
					\$8,526.15	
30750B	2/9/2010	ERM	75% Reichhold 25% Glacier	12/27/2009–1/23/2010	\$4,711.71	Project Management and Regulatory Communications
					\$262.00	Quarterly Groundwater Level Measurements
					\$3,389.59	Adjacent Sites Document Reviews
					\$8,363.30	
54386-B	10-Aug-12	ERM	CalPortland Company	7/28/2012	\$4,450.00	Project Management
					\$11,439.50	Regulatory Negotiations and Meetings
					\$1,884.00	Quarterly Groundwater Level Measurements



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Table B2: ERM Invoice Summary

Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services Invoiced
					\$440.00	Adjacent Sites Document Reviews
					\$3,501.09	2011 Sampling Wrap-up
					\$11,988.11	Spring 2012 GW Sampling/IDW Disposal
					\$22,100.25	Sediment Sampling
					\$55,802.95	
57010B	12-Nov-12	ERM	CalPortland Company	9-30-2012 to 10-27-2012	\$4,195.00	Project Management
					\$6,495.00	Regulatory Negotiations and Meetings
					\$440.00	Adjacent Sites Document Reviews
					\$2,491.00	Spring 2012 GW Sampling/IDW Disposal
					\$19,702.50	Sediment Sampling
					\$120,435.30	Boring, Monitoring Well Installation and River Bank Soil Sampling
					\$14,778.55	Storm water and Storm water Solids Sampling
					\$168,537.35	
57694-B	10-Dec-12	ERM	CalPortland Company	28 October through 24 November 2012	\$6,999.28	Project Management
					\$5,460.00	Regulatory Negotiations and Meetings
					\$2,493.66	Quarterly Groundwater Level Measurements
					\$440.00	Adjacent Sites Document Reviews
					\$2,759.00	Spring 2012 GW Sampling/IDW Disposal
					\$9,767.00	Sediment Sampling
					\$7,504.79	Boring, Monitoring Well Installation and River Bank Soil Sampling
					\$10,403.23	Storm water and Storm water Solids Sampling



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Table B2: ERM Invoice Summary

Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services Invoiced
					\$45,826.96	
58752-B	10-Jan-13	ERM	CalPortland Company	25 November 2012 through 31 December	\$6,770.00	Project Management
					\$4,296.85	Regulatory Negotiations and Meetings
					\$390.00	Adjacent Sites Document Reviews
					\$6,271.00	Spring 2012 GW Sampling/IDW Disposal
					\$24,232.45	Sediment Sampling
					\$27,067.40	Boring, Monitoring Well Installation and River Bank Soil Sampling
					\$8,284.88	Storm water and Storm water Solids Sampling
					\$77,312.58	
59801-B	11-Feb-13	ERM	CalPortland Company	01 January 2013 through 26 January 2013	\$3,460.00	Project Management
					\$10,275.00	Regulatory Negotiations and Meetings
					\$1,816.14	Quarterly Groundwater Level Measurements
					\$220.00	Adjacent Sites Document Reviews
					\$10,669.50	RI Sed Data Summary and Archive Analysis
					\$18,101.00	RI Soil Sampling Wrap-up
					\$8,199.84	Storm Water Sampling
					\$52,741.48	
60802-B	3-Mar-13	ERM	CalPortland Company	27 January through 23 February 2013	\$3,840.00	Project Management
					\$10,065.00	Regulatory Negotiations and Meetings
					\$252.00	Quarterly Groundwater Level Measurements
					\$880.00	Adjacent Sites Document Reviews
					\$20,433.50	RI Sed Data Summary and Archive Analysis
					\$10,871.50	RI Soil Sampling Wrap-up
					\$6,597.00	Storm Water Sampling
					\$52,939.00	



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Table B2: ERM Invoice Summary

Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services Invoiced
61697-B	12-Apr-13	ERM	CalPortland Company	24 February 2013 through 31 March 2013	\$6,255.00	Project Management
					\$33,218.56	Regulatory Negotiations and Meetings
					\$1,863.50	Quarterly Groundwater Level Measurements
					\$630.00	Adjacent Sites Document Reviews
					\$7,943.00	RI Sed Data Summary and Archive Analysis
					\$15,807.86	RI Soil Sampling Wrap-up
					\$11,578.63	Storm Water Sampling
					\$77,296.55	
62783-B	15-May-13	ERM	CalPortland Company	01 April through 27 April 2013	\$5,510.00	Project Management
					\$47,123.92	Regulatory Negotiations and Meetings
					\$444.00	Quarterly Groundwater Level Measurements
					\$440.00	Adjacent Sites Document Reviews
					\$3,587.00	RI Sed Data Summary and Archive Analysis
					\$3,242.00	RI Soil Sampling Wrap-up
					\$10,788.11	Storm Water Sampling
					\$71,135.03	
63910-B	20-Jun-13	ERM	CalPortland Company	28 April through 25 May 2013	\$6,547.00	Project Management
					\$12,925.00	Regulatory Negotiations and Meetings
					\$6,507.84	Quarterly Groundwater Level Measurements
					\$2,748.00	Adjacent Sites Document Reviews
					\$9,986.16	RI Sed Data Summary and Archive Analysis
					\$3,014.50	RI Soil Sampling Wrap-up
					\$9,251.98	Storm Water Sampling
					\$1,448.50	Remedial Investigation Reporting
					\$52,428.98	
64867-B	23-Jul-13	ERM	CalPortland Company	26 May through 29 June 2013	\$5,016.25	Project Management
					\$15,682.50	Regulatory Negotiations and Meetings
					\$88.50	Quarterly Groundwater Level Measurements
					\$11,059.72	Adjacent Sites Document Reviews
					\$1,919.91	RI Sed Data Summary and Archive Analysis
					\$5,012.58	RI Soil Sampling Wrap-up
					\$1,840.50	Remedial Investigation Reporting
					\$40,619.96	



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Table B2: ERM Invoice Summary

Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services Invoiced
65902-B	21-Aug-13	ERM	CalPortland Company	30 June through 27 July 2013	\$5,429.00	Project Management
					\$25,266.57	Regulatory Negotiations and Meetings
					\$528.00	Quarterly Groundwater Level Measurements
					\$6,914.50	Adjacent Sites Document Reviews
					\$2,256.50	RI Sed Data Summary and Archive Analysis
					\$2,049.00	RI Soil Sampling Wrap-up
					\$704.99	Storm Water Sampling
					\$4,500.50	Work Plan Addendum
					\$7,614.43	Tidal Study
					\$55,263.49	
69675-B	9-Dec-13	ERM	CalPortland Company	27 October through 23 November 2013	\$3,860.00	Project Management
					\$4,216.00	Regulatory Negotiations and Meetings
					\$2,289.00	Quarterly Groundwater Level Measurements
					\$799.17	Adjacent Sites Document Reviews
					\$44,040.28	Uplands Shallow Soil Sampling
					\$55,204.45	
70646-B	13-Jan-14	ERM	CalPortland Company	24 November through 31 December 2013	\$2,092.50	Project Management
					\$5,562.00	Regulatory Negotiations and Meetings
					\$87.00	Quarterly Groundwater Level Measurements
					\$1,336.64	Adjacent Sites Document Reviews
					\$42,852.28	Uplands Shallow Soil Sampling
					\$51,930.42	
72434-B	10-Mar-14	ERM	CalPortland Company	26 January through 22 February 2014	\$4,258.00	Project Management
					\$10,380.50	Regulatory Negotiations and Meetings
					\$3,263.94	Quarterly Groundwater Level Measurements
					\$650.00	Adjacent Sites Document Reviews
					\$2,049.00	Historical Stormwater Pipe Abandonment Plan
					\$67,923.26	Uplands Soil Sampling and Monitoring Well Installations
					\$3,838.90	March 2014 Groundwater Sampling
					\$591.00	Remedial Investigation Data Reporting



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Table B2: ERM Invoice Summary

Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services Invoiced
					\$92,954.60	
74536-B	8-May-14	ERM	CalPortland Company	01 April through 26 April 2014	\$5,710.50	Project Management
					\$2,196.50	Regulatory Negotiations and Meetings
					\$736.00	Quarterly Groundwater Level Measurements
					\$2,868.00	Adjacent Sites Document Reviews
					\$78,004.60	Uplands Soil Sampling and Monitoring Well Installations
					\$28,044.80	March 2014 Groundwater Sampling
					\$9,615.50	Remedial Investigation Data Reporting
					\$127,175.90	
80017-B	31-Oct-14	ERM	CalPortland Company	29 August through 30 September 2014	\$8,041.00	Project Management
					\$9,856.72	Regulatory Negotiations and Meetings
					\$4,076.37	Adjacent Sites Document Reviews
					\$24,452.00	Remedial Investigation Data Reporting
					\$323.50	Monitoring Well Development
					\$16,119.68	Historical Stormwater Pipe Abandonment



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Table B2: ERM Invoice Summary

Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services Invoiced
					\$51,584.39	August 2014 Groundwater Sampling
					\$114,453.66	
81029	2-Dec-14	ERM	CalPortland Company	01 October through 22 November 2014	\$10,823.50	Project Management
					\$6,093.56	Regulatory Negotiations and Meetings
					\$606.00	Quarterly Groundwater Level Measurements
					\$976.00	Adjacent Sites Document Reviews
					\$1,819.00	Remedial Investigation Data Reporting
					\$3,569.00	Historical Stormwater Pipe Abandonment
					\$9,569.50	August 2014 Groundwater Sampling
					\$33,456.56	
82591	15-Jan-15	ERM	CalPortland Company	23 November 2014 through 02 January 2015	\$6,130.25	Project Management
					\$3,167.39	Regulatory Negotiations and Meetings
					\$4,562.00	Quarterly Groundwater Level Measurements
					\$1,027.00	Adjacent Sites Document Reviews
					\$8,621.16	Remedial Investigation Data Reporting
					\$153.00	Monitoring Well Development
					\$798.50	Historical Stormwater Pipe Abandonment
					\$6,981.75	August 2014 Groundwater Sampling
					\$6,976.00	3-Dimensional Model
					\$38,417.05	
88532	14-Jul-15	ERM	CalPortland Company	May 30 through July 4, 2015	\$3,904.00	Project Management
					\$8,543.18	Regulatory Negotiations and Meetings
					\$1,192.00	Quarterly Groundwater Level Measurements
					\$6,881.33	March 2015 Groundwater Sampling
					\$20,520.51	



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Table B2: ERM Invoice Summary

Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced
90007	20-Aug-15	ERM			\$6,962.39	THIS INVOICE WAS VOIDED BY ERM AFTER WE PAID IT AND THEY APPLIED A CREDIT TO THEIR NOVEMBER INVOICE NO. 92433
90629	9-Sep-15	ERM	CalPortland Company	July 5 through August 29, 2015	\$4,672.00	Project Management
					\$1,556.50	Regulatory Negotiations and Meetings
					\$4,862.75	Quarterly Groundwater Level Measurements
					\$370.00	Adjacent Sites Document Reviews
					\$1,963.45	Laboratory Archive Samples Storage Fees
					\$2,445.44	March 2015 Groundwater Sampling
					\$5,239.67	August/September 2015 Groundwater Sampling
					\$21,109.81	
91462	8-Oct-15	ERM	CalPortland Company	August 30 through October 3, 2015	\$2,759.00	Project Management
					\$858.00	Regulatory Negotiations and Meetings
					\$824.00	Quarterly Groundwater Level Measurements
					\$1,306.25	Adjacent Sites Document Reviews
					\$296.50	March 2015 Groundwater Sampling
					\$62,304.72	August/September 2015 Groundwater Sampling
					\$68,348.47	
92433	5-Nov-15	ERM	CalPortland Company	August 30 through October 3, 2015	\$2,137.00	Project Management
					\$1,649.00	Regulatory Negotiations and Meetings



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Table B2: ERM Invoice Summary

Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services Invoiced
					\$185.00	Quarterly Groundwater Level Measurements
					\$3,066.50	Adjacent Sites Document Reviews
					\$1,877.85	Laboratory Archive Samples Storage Fees
					\$23,864.38	August/September 2015 Groundwater Sampling
					\$32,779.73	
93416	4-Dec-15	ERM	CalPortland Company	November 1 through November 28, 2015	\$3,129.00	Project Management
					\$673.00	Regulatory Negotiations and Meetings
					\$3,129.29	Quarterly Groundwater Level Measurements
					\$1,541.00	Adjacent Sites Document Reviews
					\$3,361.88	August/September 2015 Groundwater Sampling
					\$11,834.17	
94319	12-Jan-16	ERM	CalPortland Company	November 29, 2015 through January 1, 2016	\$4,264.50	Project Management
					\$555.00	Regulatory Negotiations and Meetings
					\$370.00	Quarterly Groundwater Level Measurements
					\$1,037.50	Adjacent Sites Document Reviews
					\$2,954.64	August/September 2015 Groundwater Sampling
					\$9,181.64	
95582	12-Feb-16	ERM	CalPortland Company	January 2 through January 30, 2016	\$2,677.75	Project Management
					\$488.00	Regulatory Negotiations and Meetings
					\$1,032.50	Quarterly Groundwater Level Measurements
					\$2,264.50	Adjacent Sites Document Reviews
					\$6,462.75	
96517	10-Mar-16	ERM	CalPortland Company	January 31 through February 27, 2016	\$488.00	Project Management
					\$185.00	Regulatory Negotiations and Meetings
					\$74.50	Quarterly Groundwater Level Measurements
					\$1,760.15	Laboratory Archive Samples Storage Fees
					\$2,507.65	



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Table B2: ERM Invoice Summary

Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services Invoiced
24390	9-Dec-08	ERM	Reichold, Inc.	For Professional Services rendered from October 26, 2008 through November 22, 2008	\$17,229.60	Well Repair
25404-B	10-Feb-09	ERM	Reichold, Inc.	29 September 2008 through 31 December 2008	\$52,982.68	Well Repair and Development
26019-B	23-Mar-09	ERM	Reichold, Inc.	1 January 2009 through 21 February 2009	\$56,624.05	Pre-Sampling Field Activities, Agreed Order/SOW Negotiations, Assessment of Site Development, Supplemental GW Sampling, Regulatory Negotiations and PM
26338-B	14-Apr-09	ERM	Reichold, Inc.	22 February through 1 April 2009	\$68,574.41	Pre-Sampling/Field Activities, Agreed Order Negotiations, Assessment of Site Development/History, Groundwater Sampling and Analysis Plans/Pre-AO Sampling Strategy, Project Management and Regulatory Communications
26833-B	8-May-09	ERM	Reichold, Inc.	2 April through 25 April 2009	\$32,829.97	Pre-Sampling/Field Activities, Agreed Order Negotiations, Assessment of Site Development/History, Groundwater Sampling, Supplemental Data Gaps Report, GIS Database Development Project Management and Regulatory Communications
27361-B	5-Jun-09	ERM	Reichold, Inc.	26 April through 23 May 2009	\$67,184.09	Pre-Sampling/Field Activities, Agreed Order Negotiations, Assessment of Site Development/History, Groundwater Sampling, Supplemental Data Gaps Report, GIS Database Development Project Management and Regulatory Communications
49226-A	17-Feb-12	ERM	Reichold, Inc.	1/7/12 – 1/28/12	\$40,284.96	R-G Site Remediation
50067-A	9-Mar-12	ERM	Reichold, Inc.	1/29/12–2/25/12	\$32,285.57	R-G Site Remediation
51136-A	10-Apr-12	ERM	Reichold, Inc.	2/26/12–3/31/20	\$33,096.13	R-G Site Remediation



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Table B2: ERM Invoice Summary

Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced
52717-A	10-Jun-12	ERM	Reichold, Inc.	4/1/12–5/26/12	\$126,514.00	R-G Site Remediation
55185-A	14-Sep-12	ERM	Reichold, Inc.	7/29/12–8/31/12	\$115,471.59	R-G Site Remediation
55825-A	10-Oct-12	ERM	Reichold, Inc.	9/1/12–9/29/12	\$131,994.37	R-G Site Remediation
68038-A	24-Oct-13	ERM	Reichold, Inc.	8/25/12–9/28/13	\$74,253.20	R-G Site Remediation
68661-A	8-Nov-13	ERM	Reichold, Inc.	9/29/13–10/26/13	\$86,346.28	107Ee05 R G 2013 Site Remediation
71356-A	5-Feb-14	ERM	Reichold, Inc.	1/1/14–1/25/14	\$55,948.54	107Ee05 R G 2014 Site Remediation
76331B	10-Jul-14	ERM	Reichold, Inc.	5/25/14–6/28/14	\$53,754.98	107Ee05 R G 2014 Site Remediation
73331-A	4-Apr-14	ERM	Reichold, Inc.	2/23/14–3/31/14	\$120,675.27	107Ee05 R G 2014 Site Remediation
77683-A	14-Aug-14	ERM	Reichold, Inc.	7/29/14–7/26/14	\$63,901.54	107Ee05 R G 2014 Site Remediation
78647-A	12-Sep-14	ERM	Reichold, Inc.	through 8/29/14	\$126,610.97	107Ee05 R G 2014 Site Remediation
					\$51,879.04	
107 invoices						
total cost					\$4,854,108.50	



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Table B3: RETEC Invoice Summary

Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed
12950297	1/5/1996	Retec	Reichhold 75% Lonestar 25%	December 1995 (net 30 days)	\$2,249.13	Project management	no reference to specific site area
					\$36.58	Conceptual Workplan	
					\$1,644.08	RI/FS workplan	
					\$14,794.24	Field sampling	
					\$18,724.03		
19600328	2/2/1996	Retec	Reichhold 75% Lonestar 25%	January 1996 (net 30 days)	\$909.60	Project management	no reference to specific site area
					\$875.00	Conceptual Workplan	
					\$1,805.32	RI/FS workplan	
					\$6,053.05	Field sampling	
					\$5,392.40	RI Report	
					\$176.00	Preliminary Feasibility Report	
29600117	2/29/1996	Retec	Reichhold 75% Lonestar 25%	February 1996 (net 30 days)	\$15,211.37		
					\$1,217.48	Project management	no reference to specific site area
					\$250.00	Conceptual Workplan	
					\$529.10	RI/FS workplan	
					\$3,503.98	Field sampling	
					\$2,588.42	RI Report	
39600206	4/4/1996	Retec	Reichhold 75% Lonestar 25%	March 1996 (net 30 days)	\$341.00	Preliminary Feasibility Report	
					\$8,429.98		
					\$2,125.32	Project management	no reference to specific site area
					\$529.10	RI/FS workplan	
					\$725.74	Field sampling	*Sum of task total does not equal sum given on invoice \$6979.17 vs \$5920.97
49600337	5/3/1996	Retec	Reichhold 75% Lonestar 25%	April 1996 (net 30 days)	\$2,155.00	RI Report	
					\$1,444.00	Preliminary Feasibility Report	
					\$5,920.97		
					\$383.50	Project management	no reference to specific site area
					\$40.00	RI/FS workplan	
					\$31.00	Field sampling	
					\$11,342.27	Phase II Field Sampling	
					\$3,082.30	RI Report	
					\$3,573.80	Preliminary Feasibility Report	
					\$18,452.87		



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Table B3: RETEC Invoice Summary

Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed
59600250	5/31/1996	Retec	Reichhold 75% Lonestar 25%	May 1996 (net 30 days)	\$208.50	Project management	no reference to specific site area
					\$352.10	RI/FS workplan	
					\$165.00	Field sampling	
					\$5,771.61	Phase II Field Sampling	
					\$9,697.00	RI Report	
					\$2,946.80	Preliminary Feasibility Report	
				Client logged incorrect amount; TIG correct	\$19,141.01		
69600377	7/3/1996	Retec	Reichhold 75% Lonestar 25%	June 1996 (net 30 days)	\$20.80	Project management	no reference to specific site area
					\$15.66	Field sampling	
					\$4.13	Phase II Field Sampling	
					\$838.65	RI Report	
					\$186.00	Preliminary Feasibility Report	
					\$1,065.24		
79600098	8/1/1996	Retec	Reichhold 75% Lonestar 25%	July 1996 (net 30 days)	\$30.00	Field sampling	no reference to specific site area
					\$1,108.60	RI Report	
					\$2,328.00	Preliminary Feasibility Report	
					\$80.00	Final Feasibility Report	
					\$3,546.60		
89600238	8/29/1996	Retec	Reichhold 75% Lonestar 25%	August 1996 (net 30 days)	\$62.00	Project management	no reference to specific site area
					\$42.50	Field sampling	
					\$2,403.00	RI Report	
					\$1,724.00	Preliminary Feasibility Report	
					\$3,102.20	Final Feasibility Report	
					\$7,333.70		
			amount off with client with 1 cent (client shows 7,333.71)				
99300375	10/1/1996	Retec	Reichhold 75% Lonestar 25%	September 1996 (net 30 days)	\$34.58	Project management	no reference to specific site area
					\$2,517.02	RI Report	
					\$45.00	Preliminary Feasibility Report	
					\$2,495.78	Final Feasibility Report	
					\$5,092.38		
					\$102,918.15		
Total							



Table B4: IT Corp Invoice Summary

Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced
	12/5/2000	IT Corp	Lone Star	6/24/2000–11/3/2000	\$6,654.25	Hydrogen peroxide injections, groundwater sampling
396620	12/23/1998	IT Corp	Lone Star 25%, Reichhold 75%	through 12/10/1998	\$63,854.10	
186848	4/12/1999	IT Corp	Lone Star 25%, Reichhold 75%	through 3/26/1999	\$58,999.42	Hydrogen peroxide injections, groundwater sampling
221553	8/27/1999	IT Corp	Lone Star 25%, Reichhold 75%	through 8/13/1999	\$48,245.25	Hydrogen peroxide injections, groundwater sampling; ozone generator inspection, shoreline permit issue
247679	11/23/1999	IT Corp	Lone Star 25%, Reichhold 75%	through 11/12/1999	\$88,281.76	Ozone sparging equipment fabrication; GW level monotiring; shoreline permit
308993	6/29/2000	IT Corp	Lone Star 25%, Reichhold 75%	through 6/2/2000	\$82,110.62	ozone sparging installation and startup; 2nd round of hydrogen peroxide injections; GW sampling
351666	11/3/2000	IT Corp	Reichhold	through 11/3/2000	\$19,962.75	Subcontractors
7 invoices					\$368,108.15	



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Table B5: Shaw Invoice Summary

Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced
340628-R8-00501	9/18/2008	Shaw	Reichhold 75% Glacier 25%	through 8/1/2008	\$73,241.71	Reichhold Inc.
340628	9/19/2008	Shaw	Reichhold 75% Glacier 25%	5/1/2008– 8/1/2008	\$40,577.46	Not indicated (covers some of the period of 340630)
345818	10/24/2008	Shaw	Reichhold 75% Glacier 25%	9/1/2008– 9/26/2008	\$14,866.74	Project management, Draft SOW
314534	7/15/2008	Shaw	Reichhold 75% Glacier 25%	Jan 2008–Apr 2008	\$662.55	Reporting (Review and catalog all significant project documentation from Fluor Daniel/GTE IT and Shaw; Evaluate technical data. Prepare Remedial Activities Summary Report)
					\$396.03	Project Management
					\$72,074.31	Reporting & Tech. Over
					\$73,132.89	
399568	11/26/2008	Shaw	Reichhold 75% Glacier 25%	10/1/2008	\$1,253.39	Secured fencing contractor and review FOIA submittals
5 invoices					\$203,072.19	



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Table B6: Fluor Daniel-GTI Invoice Summary

Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/ Geographical Reference where services were performed	COC investigated
347238	11/12/1997	Fluor Daniel-GTI	75% Reichhold 25% Lone Star	Billing through 10/3/1997. Work performed in September	\$17,621.22	work performed in support of the pilot testing. The work performed includes those related to three tasks of the work scope	no reference to specific site area	
376626	6/15/1998	Fluor Daniel-GTI	75% Reichhold 25% Lone Star	work performed in March and April Billing through 6/4/1998	\$4,686.01	work performed in support of the arsenic pilot testing. The work performed includes those related to two tasks of the work scope	no reference to specific site area	arsenic
349810	11/13/1997	Fluor Daniel-GTI	75% Reichhold 25% Lone Star	work performed in October Billing through 10/31/1997	\$695.14	work performed in support of the pilot testing. The work performed includes those related to three tasks of the work scope	no reference to specific site area	
389064	10/7/1998	Fluor Daniel-GTI	75% Reichhold 25% Lone Star	Billing through 10/01/1998	\$15,495.75	work relating to project management and the completion of the Lone Star site Remedial Action Plan	no reference to specific site area	
340880	9/17/1997	Fluor Daniel-GTI	75% Reichhold 25% Lone Star	work performed in July and August Billing through 8/1/1997	\$18,970.94	work performed in support of the pilot testing. The work performed includes those related to two tasks of the work scope	no reference to specific site area	



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Table B6: Fluor Daniel-GTI Invoice Summary

Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/ Geographical Reference where services were performed	COC investigated
363481	3/12/1998	Fluor Daniel-GTI	75% Reichhold 25% Lone Star	work performed in october 1997 and march 1998 Billing through 3/5/1998	\$11,551.98	work performed in support of the pilot testing. AI testing at site complete	no reference to specific site area	arsenic
376624	6/15/1998	Fluor Daniel-GTI	75% Reichhold 25% Lone Star	Billing through 6/4/1998	\$1,704.00	Worst case scenario for cleanup	no reference to specific site area	

7 invoices

total cost

\$70,725.04



Table B7: Ecology Invoice Summary
Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed	Site operator linked to Site Location*	COC investigated	Site operator linked to COC	% of total cost
1T000423-01-AA	10/30/2009	Department of Ecology	Glacier (is not prorated between liable parties.)	3/1/1991–6/30/2009	\$142,212.08	Literature review, SOW, PM, document review, draft Administrative order, meetings	no reference to specific site area				
1T000423-02-AB	12/15/2009	Department of Ecology	Glacier (is not prorated between liable parties.)	7/1/2009–9/30/2009	\$5,692.54	Environmental Engineer labor	no reference to specific site area				
1T000423-03-AA	4/1/2010	Department of Ecology	Glacier (is not prorated between liable parties.)	12/1/2009–12/31/2009	\$215.62	Site visit-trenching for 15 inch pipe	no reference to specific site area				
1T000423-04-AA	6/10/2010	Department of Ecology	Glacier (is not prorated between liable parties.)	1/1/2010–3/31/2010	\$27,574.60	Data gaps report, internal coordination, research, communications with site manager	no reference to specific site area	\$27,574.60			
1T000423-05-AA	9/10/2010	Department of Ecology	Glacier (is not prorated between liable parties.)	4/1/2010–6/30/2010	\$26,127.17	Data gaps report, internal coordination, research, communications with site manager	no reference to specific site area	\$26,127.17			
1T000423-06-AA	12/10/2010	Department of Ecology	Glacier (is not prorated between liable parties.)	7/1/2010–9/30/2010	\$9,947.08	Data gaps report, internal coordination, research, communications with site manager, Agreed Order, site visit for review of current conditions	no reference to specific site area	\$9,947.08			
1T000423-07-AA	3/10/2011	Department of Ecology	Glacier (is not prorated between liable parties.)	10/1/2010–12/31/2010	\$2,176.93	Review draft outlines for RI/FS and SAP, records management, research, communications with site manager	no reference to specific site area	\$2,176.93			
1T000423-08-AA	6/1/2011	Department of Ecology	Glacier (is not prorated between liable parties.)	1/1/2011–3/31/2011	\$3,713.15	Review historic information of Cell Mineralization, review RI and sampling plan, research, communications with site manager	Cell Mineralization	\$3,713.15			
1T000423-09-AA	9/1/2011	Department of Ecology	Glacier (is not prorated between liable parties.)	4/1/2011–6/30/2011	\$15,532.37	Review RI/FS work plan, GIS data management and mapping	no reference to specific site area	\$15,532.37			
1T000423-10-AA	12/10/2011	Department of Ecology	Glacier (is not prorated between liable parties.)	7/1/2011–9/30/2011	\$10,606.65	Review and edit Sampling and Analysis Plan	no reference to specific site area	\$10,606.65			
1T000423-11-AA	3/1/2012	Department of Ecology	Glacier (is not prorated between liable parties.)	10/1/2011–12/31/2011	\$12,463.18	internal and external communication, Glacier well installation review reports	no reference to specific site area				
1T000423-12-AA	6/1/2012	Department of Ecology	Glacier (is not prorated between liable parties.)	1/1/2012–3/31/2012	\$11,298.01	Review soil sampling proposal, work plan review, review fall sampling results, external communications,	no reference to specific site area				
1T000423-13-AA	9/1/2012	Department of Ecology	Glacier (is not prorated between liable parties.)	4/1/2012–6/30/2012	\$13,056.89	Comment letter, internal and external communication, Approval letter, review final work plan, observe sediment sampling	no reference to specific site area				
1T000423-14-AA	12/10/2010	Department of Ecology	Glacier (is not prorated between liable parties.)	7/1/2012–9/30/2012	\$24,141.05	Ecology comments, internal and external meetings/communication, review dispute resolution	no reference to specific site area				
1T000423-15-AA	3/1/2013	Department of Ecology	Glacier (is not prorated between liable parties.)	10/1/2012–12/31/2012	\$45,101.07	Internal and external meetings, review dispute resolution, finalize SOPs, response letter and cost estimate	no reference to specific site area				
1T000423-16-AA	6/1/2013	Department of Ecology	Glacier (is not prorated between liable parties.)	1/1/2013–3/31/2013	\$39,035.73	review dispute resolutions documents, internal and external meetings, develop figures	no reference to specific site area				

**Table B7: Ecology Invoice Summary**

Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed	Site operator linked to Site Location*	COC investigated	Site operator linked to COC	% of total cost
1T000423-17-AA	9/1/2013	Department of Ecology	Glacier (is not prorated between liable parties.)	4/1/2013–6/30/2013	\$65,748.44	prepare WP/SAP/QAPP, update aerial maps, groundwater and soil maps, dispute resolution support, research Geotech/Silo construction	no reference to specific site area				
1T000423-18-AA	12/10/2013	Department of Ecology	Glacier (is not prorated between liable parties.)	7/1/2013–9/30/2013	\$60,820.33	dispute resolution support, review work plan, update maps, internal and external meetings	no reference to specific site area				
1T000423-19-AA	3/15/2014	Department of Ecology	Glacier (is not prorated between liable parties.)	10/1/2013–12/31/2013	\$43,351.62	dispute resolution support, internal and external meetings, observe onsite field work, update maps, prepare figures	no reference to specific site area				
1T000423-20-AA	6/1/2014	Department of Ecology	Glacier (is not prorated between liable parties.)	1/1/2014–3/31/2014	\$32,002.93	field observations for soil boring, sampling and well installation, review os results, internal and external communication	no reference to specific site area				
1T000423-21-AA	9/1/2014	Department of Ecology	Glacier (is not prorated between liable parties.)	4/1/2014–6/30/2014	\$23,067.88	review of soil data, project management, internal and external communication/meetings, review groundwater data	no reference to specific site area				
1T000423-22-AA	12/15/2014	Department of Ecology	Glacier (is not prorated between liable parties.)	7/1/2014–9/30/14	\$26,066.44						
1T000423-23-AA	3/5/2015	Department of Ecology	Glacier (is not prorated between liable parties.)	10/1/2014–12/31/2014	\$4,655.25	Glacier NW Remedial Investigation	no reference to specific site area				
1T000423-24-AA	6/1/2015	Department of Ecology	Glacier (is not prorated between liable parties.)	1/1/2015–3/31/2015	\$5,041.32	Glacier NW Remedial Investigation	no reference to specific site area				
1T000423-25-AA	9/1/2015	Department of Ecology	Glacier (is not prorated between liable parties.)	4/1/2015–6/30/2015	\$17,120.52	Glacier NW Remedial Investigation	no reference to specific site area				
1T000423-27-AA	3/10/2016	Department of Ecology	Glacier (is not prorated between liable parties.)	10/1/2015–12/31/2015	\$1,476.45	Glacier NW Remedial Investigation	no reference to specific site area				
1T000423-29-AA	9/1/2016	Department of Ecology	Glacier (is not prorated between liable parties.)	4/1/2016–6/30/2016	\$65.14	Glacier NW Remedial Investigation	no reference to specific site area				
1T000423-30-AA	12/15/2016	Department of Ecology	Glacier (is not prorated between liable parties.)	6/1/2016–9/30/2016	\$1,145.27	Glacier NW Remedial Investigation	no reference to specific site area				
1T000423-31-AA	3/10/2017	Department of Ecology	Glacier (is not prorated between liable parties.)	10/1/2016–12/31/2016	\$4,803.40	Glacier NW Remedial Investigation	no reference to specific site area				
1T000423-32-AA	7/10/2017	Department of Ecology	Glacier (is not prorated between liable parties.)	1/1/2017–3/31/2017	\$7,668.62	Glacier NW Remedial Investigation	no reference to specific site area				
1T000423-33-AA	9/1/2017	Department of Ecology	Glacier (is not prorated between liable parties.)	4/1/2017–6/30/2017	\$9,810.56	Glacier NW Remedial Investigation	no reference to specific site area				
1T000423-34-AA	12/15/2017	Department of Ecology	Glacier (is not prorated between liable parties.)	7/1/2017–9/30/2017	\$4,406.81	Glacier NW Remedial Investigation	no reference to specific site area				



Table B7: Ecology Invoice Summary
Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed	Site operator linked to Site Location*	COC investigated	Site operator linked to COC	% of total cost
1T000423-35-AA	3/20/2018	Department of Ecology	Glacier (is not prorated between liable parties.)	10/1/2017–12/31/2017	\$11,014.98	Glacier NW Remedial Investigation	no reference to specific site area				
1T000423-36-AA	6/8/2018	Department of Ecology	Glacier (is not prorated between liable parties.)	1/1/2018–3/31/2018	\$2,587.92	Glacier NW Remedial Investigation	no reference to specific site area				
1T000423-37-AA	9/1/2018	Department of Ecology	Glacier (is not prorated between liable parties.)	4/1/2018–6/30/2018	\$6,504.45	Glacier NW Remedial Investigation	no reference to specific site area				
1T000423-39-AA	3/1/2019	Department of Ecology	Glacier (is not prorated between liable parties.)	10/1/2018–12/31/2018	\$836.58	Glacier NW Remedial Investigation	no reference to specific site area				
1T000423-40-AA	6/1/2019	Department of Ecology	Glacier (is not prorated between liable parties.)	1/1/2019–3/31/2019	\$441.66	Glacier NW Remedial Investigation	no reference to specific site area				
1T000423-41-AA	9/1/2019	Department of Ecology	Glacier (is not prorated between liable parties.)	4/1/2019–6/30/2019	\$147.22	Glacier NW Remedial Investigation	no reference to specific site area				
1T000423-42-AA	12/1/2019	Department of Ecology	Glacier (is not prorated between liable parties.)	7/1/2019–9/30/2019	\$3,479.09	Glacier NW Remedial Investigation	no reference to specific site area				
1T000423-43-AA	3/1/2020	Department of Ecology	Glacier (is not prorated between liable parties.)	10/1/2019–12/31/2019	\$2,692.23	Glacier NW Remedial Investigation	no reference to specific site area				

total cost **\$723,849.23**



Table B8: CH2M Hill Invoice Summary
Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed	Cost not related to Glacier NW Uplands cleanup
3632263	12/21/2007	CH2MHill	Reichhold, Inc.	1/22/2007–12/21/2007	\$2,369.52	For Engineering Services initiated on January 22, 2007 through December 21, 2007, including site support	D1 Tacoma Site	\$2,369.52
3645098	3/28/2008	CH2MHill	Reichhold, Inc.	2/29/2008	\$7,046.87	For engineering services through February 29, 2008, in connection with Seattle Terminal Site Closure, including site visits, meetings and phone conversations, and file and regulatory reviews, and technical memorandums and report preparation	Seattle Terminal, no specific location referenced	
3648267	4/22/2008	CH2MHill	Reichhold, Inc.	3/28/2008	\$2,507.23	For engineering services through March 28, 2008, in connection with Seattle Terminal Site Closure, including site visits, meetings and phone conversations, and file and regulatory reviews, and technical memorandums and report preparation	Seattle Terminal, no specific location referenced	
3650749	5/12/2008	CH2MHill	Reichhold, Inc.	4/25/2008	\$3,215.20	For engineering services through April 25, 2008, in connection with Seattle Terminal Site Closure, including file and regulatory reviews, and technical memorandums and report preparation	Seattle Terminal, no specific location referenced	
3657426	6/30/2008	CH2MHill	Reichhold, Inc.	5/30/2008	\$3,482.03	For engineering services through May 30, 2008, in connection with Seattle Terminal Site Closure, including file and regulatory reviews, and technical memorandums and report preparation	Seattle Terminal, no specific location referenced	
3657814	7/3/2008	CH2MHill	Reichhold, Inc.	5/31/2008–6/27/2008	\$7,016.93	For engineering services from May 31, 2008 through June 27, 2008 in connection with Seattle Terminal Site Closure, including file and regulatory reviews, technical memorandums and report preparation, and review of site soil and groundwater remediation status	Seattle Terminal, no specific location referenced	
3663930	7/25/2008	CH2MHill	Reichhold, Inc.	6/28/2008–7/25/2008	\$10,538.04	For engineering services from June 28, 2008 through July 25, 2008 in connection with Seattle Terminal Site Closure, including site visits, meetings and phone conversations, file and regulatory reviews, technical memorandums and report preparation, and review of site soil and groundwater remediation status	Seattle Terminal, no specific location referenced	
3668175	9/22/2008	CH2MHill	Reichhold, Inc.	7/26/2008–8/29/2008	\$4,305.88	For engineering services from July 26, 2008 through August 29, 2008 in connection with Seattle Terminal Site Closure, including site visits, meetings and phone conversations, file and regulatory reviews, technical memorandums and report preparation, and review of site soil and groundwater remediation status	Seattle Terminal, no specific location referenced	
3670098	10/7/2008	CH2MHill	Reichhold, Inc.	8/30/2008–9/26/2008	\$5,214.74	For engineering services from August 30, 2008 through September 26, 2008 in connection with Seattle Terminal Site Closure, including site visits, meetings and phone conversations, and file and regulatory reviews, and technical memorandums and report preparation	Seattle Terminal, no specific location referenced	



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Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed	Cost not related to Glacier NW Uplands cleanup
3674503	11/10/2008	CH2MHill	Reichhold, Inc.	9/27/2008–10/31/2008	\$7,615.42	For engineering services from September 27, 2008 through October 31, 2008 in connection with Seattle Terminal Site Closure, including site visits, meetings and phone conversations, file and regulatory reviews, technical memorandums and report preparation, and review of site soil and groundwater remediation status	Seattle Terminal, no specific location referenced	
3677960	12/2/2008	CH2MHill	Reichhold, Inc.	11/1/2008–11/28/2008	\$7,037.32	For engineering services from November 1, 2008 through November 28, 2008 in connection with Seattle Terminal Site Closure, including site visits, meetings and phone conversations, and review of site soil and groundwater remediation status	Seattle Terminal, no specific location referenced	
3683099	1/12/2009	CH2MHill	Reichhold, Inc.	11/29/2008–12/26/2008	\$3,891.27	For engineering services from November 29, 2008 through December 26, 2008 in connection with Seattle Terminal Site Closure, including site visits, meetings and phone conversations, and review of site soil and groundwater remediation status	Seattle Terminal, no specific location referenced	
3689430	2/26/2009	CH2MHill	Reichhold, Inc.	12/27/2008–1/30/2009	\$1,004.90	For engineering services from December 27, 2008 through January 30, 2009, including Seattle CERCLA Section 104(e) Process/Duwamish Waterway Assistance	Seattle Terminal, no specific location referenced	\$1,004.90
3689482	2/26/2009	CH2MHill	Reichhold, Inc.	12/27/2008–1/30/2009	\$6,737.98	For engineering services from December 27, 2008 through January 30, 2009, including document review, site visits, agency and team meetings, memo and report preparation	Seattle Terminal, no specific location referenced	
3691874	3/17/2009	CH2MHill	Reichhold, Inc.	1/31/2009–2/27/2009	\$6,954.97	For engineering services from January 31, 2009 through February 27, 2009, including document review, site visits, agency and team meetings, memo and report preparation	Seattle Terminal, no specific location referenced	
3691880	3/17/2009	CH2MHill	Reichhold, Inc.	1/31/2009–2/27/2009	\$2,962.48	For engineering services from January 31, 2009 through February 27, 2009, including Seattle CERCLA Section 104(e) Process/Duwamish Waterway Assistance	Seattle Terminal, no specific location referenced	\$2,962.48
3694825	4/9/2009	CH2MHill	Reichhold, Inc.	2/28/2009–3/27/2009	\$9,066.03	For engineering services from February 28, 2009 through March 27, 2009, including document review, site visits, agency and team meetings, memo and report preparation	Seattle Terminal, no specific location referenced	
3694838	4/9/2009	CH2MHill	Reichhold, Inc.	2/28/2009–3/27/2009	\$1,561.12	For engineering services from February 28, 2009 through March 27, 2009, including Seattle CERCLA Section 104(e) Process/Duwamish Waterway Assistance	Seattle Terminal, no specific location referenced	
3699621	5/1/2009	CH2MHill	Reichhold, Inc.	3/28/2009–4/24/2009	\$6,352.81	For engineering services from March 28, 2009 through April 24, 2009, including document review, site visits, agency and team meetings, memo and report preparation	Seattle Terminal, no specific location referenced	
3706292	6/25/2009	CH2MHill	Reichhold, Inc.	4/25/2009–5/29/2009	\$4,863.18	For engineering services from April 25, 2009 through May 29, 2009, including document review, site visits, agency and team meetings, memo and report preparation	Seattle Terminal, no specific location referenced	



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Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed	Cost not related to Glacier NW Uplands cleanup
3710556	7/28/2009	CH2MHill	Reichhold, Inc.	5/30/2009–6/26/2009	\$4,141.56	For engineering services from May 30, 2009 through June 26, 2009, including document review, site visits, agency and team meetings, memo and report preparation	Seattle Terminal, no specific location referenced	
3715184	8/28/2009	CH2MHill	Reichhold, Inc.	4/25/2009–7/31/2009	\$3,860.65	For engineering services from April 25, 2009 through July 31, 2009, including Seattle CERCLA Section 104(e) Process/Duwamish Waterway Assistance	Seattle Terminal, no specific location referenced	\$3,860.65
3715312	8/28/2009	CH2MHill	Reichhold, Inc.	6/27/2009–7/31/2009	\$3,511.72	For engineering services from June 27, 2009 through July 31, 2009, including document review, site visits, agency and team meetings, memo and report preparation	Seattle Terminal, no specific location referenced	
3723409	10/29/2009	CH2MHill	Reichhold, Inc.	8/1/2009–9/25/2009	\$4,904.25	For engineering services from August 1, 2009 through September 25, 2009, including document review, site visits, agency and team meetings, memo and report preparation	Seattle Terminal, no specific location referenced	
3723475	10/29/2009	CH2MHill	Reichhold, Inc.	8/1/2009–9/25/2009	\$1,935.40	For engineering services from August 1, 2009 through September 25, 2009, including Seattle CERCLA Section 104(e) Process/Duwamish Waterway Assistance	Seattle Terminal, no specific location referenced	\$1,935.40
3726488	10/30/2009	CH2MHill	Reichhold, Inc.	9/26/2009–10/30/2009	\$9,875.06	For engineering services from September 26, 2009 through October 30, 2009, including document review, site visits, agency and team meetings, memo and report preparation	Seattle Terminal, no specific location referenced	
3731061	12/22/2009	CH2MHill	Reichhold, Inc.	10/31/2009–11/27/2009	\$1,452.65	For engineering services from October 31, 2009 through November 27, 2009, including document review, site visits, agency and team meetings, memo and report preparation	Seattle Terminal, no specific location referenced	
3731081	12/22/2009	CH2MHill	Reichhold, Inc.	9/26/2009–11/27/2009	\$2,224.30	For engineering services from September 26, 2009 through November 27, 2009, including Seattle CERCLA Section 104(e) Process/Duwamish Waterway Assistance	Seattle Terminal, no specific location referenced	\$2,224.30
3732325	1/7/2010	CH2MHill	Reichhold, Inc.	11/28/2009–12/31/2009	\$3,472.23	For engineering services from November 28, 2009 through December 31, 2009, including Seattle CERCLA Section 104(e) Process/Duwamish Waterway Assistance	Seattle Terminal, no specific location referenced	\$3,472.23
3739568	3/4/2010	CH2MHill	Reichhold, Inc.	1/1/2010–1/29/2010	\$2,835.74	For engineering services from January 1, 2010 through January 29, 2010 including development of tech. approaches, review of site soil and groundwater remediation status and technologies	Seattle Terminal, no specific location referenced	
3740278	3/11/2010	CH2MHill	Reichhold, Inc.	1/1/2010–1/29/2010	\$1,095.99	For engineering services from January 1, 2010 through January 29, 2010, including Seattle CERCLA Section 104(e) Process/Duwamish Waterway Assistance	Seattle Terminal, no specific location referenced	\$1,095.99
3746551	4/29/2010	CH2MHill	Reichhold, Inc.	1/30/2010–3/26/2010	\$2,895.92	For engineering services from January 30, 2010 through March 26, 2010, including Seattle CERCLA Section 104(e) Process/Duwamish Waterway Assistance	Seattle Terminal, no specific location referenced	\$2,895.92
3746567	4/29/2010	CH2MHill	Reichhold, Inc.	1/30/2010–3/26/2010	\$6,970.94	For engineering services from January 30, 2010 through March 26, 2010 including development of tech. approaches, review of site soil and groundwater remediation status and technologies	Seattle Terminal, no specific location referenced	



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Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed	Cost not related to Glacier NW Uplands cleanup
3753348	6/24/2010	CH2MHill	Reichhold, Inc.	3/27/2010–5/28/2010	\$7,209.68	For engineering services from March 27, 2010 through May 28, 2010 including development of tech. approaches, review of site soil and groundwater remediation status and technologies	Seattle Terminal, no specific location referenced	
3756217	7/16/2010	CH2MHill	Reichhold, Inc.	5/29/2010–6/25/2010	\$2,679.22	For engineering services from May 29, 2010 through June 25, 2010 including development of tech. approaches, review of site soil and groundwater remediation status and technologies	Seattle Terminal, no specific location referenced	
3756266	7/16/2010	CH2MHill	Reichhold, Inc.	3/27/2010–6/25/2010	\$2,469.08	For engineering services from March 27, 2010 through June 25, 2010, including Seattle CERCLA Section 104(e) Process/Duwamish Waterway Assistance	Seattle Terminal, no specific location referenced	\$2,469.08
3760946	8/23/2010	CH2MHill	Reichhold, Inc.	6/26/2010–7/30/2010	\$9,279.44	For engineering services from June 26, 2010 through July 30, 2010 including development of tech. approaches, review of site soil and groundwater remediation status and technologies	Seattle Terminal, no specific location referenced	
3763489	9/14/2010	CH2MHill	Reichhold, Inc.	7/31/2010–9/30/2010	\$17,237.41	For engineering services from July 31, 2010 through September 30, 2010 including development of tech. approaches, review of site soil and groundwater remediation status and technologies	Seattle Terminal, no specific location referenced	
3771201	11/15/2010	CH2MHill	Reichhold, Inc.	6/26/2010–9/24/2010	\$1,631.90	For engineering services from June 26, 2010 through September 24, 2010, including Seattle CERCLA Section 104(e) Process/Duwamish Waterway Assistance	Seattle Terminal, no specific location referenced	\$1,631.90
3777752	1/4/2011	CH2MHill	Reichhold, Inc.	10/1/2010–10/29/2010	\$7,046.02	For engineering services from October 1, 2010 through October 29, 2010 including development of tech. approaches, review of site soil and groundwater remediation status and technologies	Seattle Terminal, no specific location referenced	
3780294	1/24/2011	CH2MHill	Reichhold, Inc.	10/30/2010–12/31/2010	\$7,113.40	For engineering services from October 30, 2010 through December 31, 2010 including development of tech. approaches, review of site soil and groundwater remediation status and technologies	Seattle Terminal, no specific location referenced	
3780311	1/24/2011	CH2MHill	Reichhold, Inc.	9/25/2010–12/31/2010	\$12,543.92	For engineering services from September 25, 2010 through December 31, 2010, including Seattle CERCLA Section 104(e) Process/Duwamish Waterway Assistance	Seattle Terminal, no specific location referenced	\$12,543.92
38111004576	5/26/2011	CH2MHill	Reichhold Inc	1/1/2011–4/29/2011	\$17,682.93	For engineering services from January 2011 through April 29 2011 in connection with the Seattle Terminal Site Closure: Development of Tech Approaches, Review of Site Soil and Groundwater Remediation Status and Technologies/project manager/technologist/ H&S manager/engineer and expenses(H&S, mileage)	no reference to specific site area	



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Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed	Cost not related to Glacier NW Uplands cleanup
38111004571	5/26/2011	CH2MHill	Reichhold Inc	1/1/2011–4/29/2011	\$12,369.02	For engineering services from January 1, 2011 through April 29 2011: Seattle CERCLA Section 104e Process/Duwamish Waterway Assistance professional services/Project manager/technologist/survey engineer/ contracts manager and expenses (USACE electronic file review)	no reference to specific site area	\$12,369.02
38111006435	7/12/2011	CH2MHill	Reichhold Inc	4/30/2011–5/27/2011	\$3,412.74	For engineering services from April 30 2011 through May 27 2011 in connection with the Seattle Terminal Site Closure: Development of Tech Approaches, Review of Site Soil and Groundwater Remediation Status and Technologies/project manager and expenses(H&S)	no reference to specific site area	
38111008623	8/25/2011	CH2MHill	Reichhold Inc	5/28/2011–7/29/2011	\$9,445.16	For engineering services from May 28 2011 through July 29 2011 in connection with the Seattle Terminal Site Closure: Development of Tech Approaches, Review of Site Soil and Groundwater Remediation Status and Technologies/project manager/technologist/engineer and expenses(H&S)	no reference to specific site area	
38111008599	8/25/2011	CH2MHill	Reichhold Inc	4/30/2011–7/29/2011	\$1,890.19	For engineering services from April 30 2011 through July 29 2011: Seattle CERCLA Section 104e Process/Duwamish Waterway Assistance professional services/Project manager/hydrogeologist	no reference to specific site area	\$1,890.19
38111010485	9/30/2011	CH2MHill	Reichhold Inc	7/30/2011–8/26/2011	\$10,056.55	For engineering services from July 30 2011 through August 26 2011 in connection with the Seattle Terminal Site Closure: Development of Tech Approaches, Review of Site Soil and Groundwater Remediation Status and Technologies/project manager/technologist	no reference to specific site area	
3111011264	10/19/2011	CH2MHill	Reichhold Inc	8/27/2011–9/30/2011	\$10,912.65	For engineering services from August 27 2011 through September 30 2011 in connection with the Seattle Terminal Site Closure: Development of Tech Approaches, Review of Site Soil and Groundwater Remediation Status and Technologies/project manager /technologist	no reference to specific site area	
3111013533	11/23/2011	CH2MHill	Reichhold Inc	10/1/2011–10/28/2011	\$4,214.03	For engineering services from October 1 2011 through October 28 2011 in connection with the Seattle Terminal Site Closure: Development of Tech Approaches, Review of Site Soil and Groundwater Remediation Status and Technologies/project manager	no reference to specific site area	
3111013471	11/23/2011	CH2MHill	Reichhold Inc	7/30/2011–10/28/2011	\$1,056.45	For engineering services from July 30 2011 through October 28 2011: Seattle CERCLA Section 104e Process/Duwamish Waterway Assistance professional services/Project manager	no reference to specific site area	\$1,056.45



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3111014697	12/15/2011	CH2MHill	Reichhold Inc	10/29/2011–12/9/2011	\$23,852.81	For engineering services from October 29 2011 through December 9 2011 and additional time estimated for the remainder of the month in connection with the Seattle Terminal Site Closure: Development of Tech Approaches Review of Site Soil and Groundwater Remediation Status and Technologies Professional Services/technologist/project manager/ engineer and expenses (H&S)	no reference to specific site area	
3111014684	12/15/2011	CH2MHill	Reichhold Inc	10/29/2011–12/9/2011	\$558.04	For engineering services from October 29 2011 through December 9, 2011: Seattle CERCLA Section 104e Process/Duwamish Waterway Assistance professional services/Project manager and expenses(mileage)	no reference to specific site area	\$558.04
38112006343	4/12/2012	CH2MHill	Reichhold Inc	12/10/2012–3/30/2012	\$1,094.13	For engineering services from December 10 2011 through March 30 2012: Seattle CERCLA Section 104e Process/Duwamish Waterway Assistance professional services/Project manager/scientist	no reference to specific site area	
38112007410	4/26/2012	CH2MHill	Reichhold Inc	12/10/2012–3/30/2012	\$11,726.10	For engineering services from December 10 2011 through March 30 2012 in connection with the Seattle Terminal Site Closure: Development of Tech Approaches, Review of Site Soil and Groundwater Remediation Status and Technologies/ project manager/engineer and expenses (H&S, mileage)	no reference to specific site area	
38112010606	6/8/2012	CH2MHill	Reichhold Inc	3/31/2012–4/27/2012	\$15,841.01	For engineering services from March 31 2012 through April 27 2012 in connection with the Seattle Terminal Site Closure: Development of Tech Approaches, Review of Site Soil and Groundwater Remediation Status and Technologies/ project manager/technologist/engineer and expenses (H&S, mileage)	no reference to specific site area	
38112012329	6/29/2012	CH2MHill	Reichhold Inc	4/28/2012–5/25/2012	\$16,087.12	For engineering services from April 28 2012 through May 25 2012 in connection with the Seattle Terminal Site Closure: Development of Tech Approaches, Review of Site Soil and Groundwater Remediation Status and Technologies/ project manager/technologist/engineer and expenses (H&S, mileage)	no reference to specific site area	
38112013828	7/23/2012	CH2MHill	Reichhold Inc	5/26/2012–6/29/2012	\$5,048.56	For engineering services from May 26 2012 through June 29 2012 in connection with the Seattle Terminal Site Closure: Development of Tech Approaches, Review of Site Soil and Groundwater Remediation Status and Technologies/ project manager/technologist and expenses (H&S, fleet vehicles)	no reference to specific site area	
38112013822	7/23/2012	CH2MHill	Reichhold Inc	4/31/2012–6/29/2012	\$671.68	For engineering services from March 31 2012 through June 29 2012: Seattle CERCLA Section 104e Process/Duwamish Waterway Assistance professional services/Project management	no reference to specific site area	\$671.68



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38112016808	8/27/2012	CH2MHill	Reichhold Inc	6/30/2012–8/27/2012	\$757.69	For engineering services from June 30 2012 through July 27 2012: Seattle CERCLA Section 104e Process/Duwamish Waterway Assistance professional services/Project management	no reference to specific site area	\$757.69
38112016805	8/27/2012	CH2MHill	Reichhold Inc	6/30/2012–8/27/2012	\$7,037.66	For engineering services from June 30 2012 through July 27 2012 in connection with the Seattle Terminal Site Closure: Development of Tech Approaches, Review of Site Soil and Groundwater Remediation Status and Technologies/ project manager/technologist and expenses (H&S, fleet vehicles)	no reference to specific site area	
38112019456	9/27/2012	CH2MHill	Reichhold Inc	7/28/2012–8/31/2012	\$4,354.81	For engineering services from July 28 2012 through August 31 2012 in connection with the Seattle Terminal Site Closure: Development of Tech Approaches, Review of Site Soil and Groundwater Remediation Status and Technologies/ project manager/technologist and expenses (H&S)	no reference to specific site area	
38112024989	11/30/2012	CH2MHill	Reichhold Inc	9/1/2012–10/26/2012	\$22,995.47	For engineering services from September 1, 2012 through October 26 2012 in connection with the Seattle Terminal Site Closure: Development of Tech Approaches, Review of Site Soil and Groundwater Remediation Status and Technologies/ project manager/technologist and expenses (H&S)	no reference to specific site area	
38113000529	1/9/2013	CH2MHill	Reichhold Inc	7/28/2012–12/31/2012	\$13,351.48	For engineering services from July 28 2012 through December 31 2012: Seattle CERCLA Section 104e Process/Duwamish Waterway Assistance professional services/Project management/technologist	no reference to specific site area	\$13,351.48
38113000524	1/9/2013	CH2MHill	Reichhold Inc	10/27/2012–12/31/2013	\$12,646.61	For engineering services from October 27 2012 through December 31 2012 in connection with the Seattle Terminal Site Closure: Development of Tech Approaches, Review of Site Soil and Groundwater Remediation Status and Technologies/technologist/project manager	no reference to specific site area	
381130120998	4/26/2013	CH2MHill	Reichhold Inc	2/23/2013 –4/29/2013	\$4,943.78	Contacted DNREC–SIRS regarding Final Response Letter and 10–Year Remedy Evaluation Report on Reichholds behalf through phone calls and e–mails Project management activities involved project coordination financial tracking and invoicing	Reichhold Cheswold Delaware Site/ Marsh Area RA, not our site	4,943.78
38113011006	4/26/2013	CH2MHill	Reichhold Inc	3/1/2013	\$25,155.08	For engineering services through March 29 2013: Duwamish assistance professional services/Project management and Reichhold closure professional services/project management/ technologist professional	no reference to specific site area	
38113014305B	5/31/2013	CH2MHill	Reichhold Inc	4/1/2013	\$18,110.92	For engineering services through April 26 2013: Reichhold closure professional services/ project management, technologist professional, Geotechnical Engineer	no reference to specific site area	



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Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

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38113014305A	5/31/2013	CH2MHill	Reichhold Inc	4/1/2013	\$424.48	For engineering services through April 26 2013:Duwamish assistance professional services/Project management	no reference to specific site area	
38113017103B	6/27/2013	CH2MHill	Reichhold Inc	4/27/2013–5/31/2013	\$10,271.83	For engineering services through May 31 2013: Reichhold Closure Professional Services/ project management, technologist professional, hydrogeologist	no reference to specific site area	
38113017103A	6/27/2013	CH2MHill	Reichhold Inc	4/27/2013–5/31/2013	\$3,364.93	For engineering services through May 31 2013: Duwamish assistance professional services/Project management	no reference to specific site area	
38113019032B	7/18/2013	CH2MHill	Reichhold Inc	6/1/2013	\$6,036.02	For engineering services through June 28 2013: Reichhold Closure Professional Services/project management/ technologist professional	no reference to specific site area	
38113019032A	7/18/2013	CH2MHill	Reichhold Inc	6/1/2013	\$2,657.73	For engineering services through June 28 2013: Duwamish assistance professional services/Project management	no reference to specific site area	
38113028227A	10/8/2013	CH2MHill	Reichhold Inc	9/6/2013–9/28/2013	\$1,076.86	For engineering services through September 27 2013: Duwamish assistance professional services/Project management/technologist professional and expenses(postage, freight, delivery)	no reference to specific site area	
38113028227B	10/18/2013	CH2MHill	Reichhold Inc	9/6/2013–9/28/2013	\$8,945.76	For engineering services through September 27 2013: Reichhold Closure Professional Services/project management/ technologist professional	no reference to specific site area	
38113030662B	11/11/2013	CH2MHill	Reichhold Inc	9/28/2013–10/25/2013	\$6,615.92	For engineering services through October 25 2013: Reichhold Closure Professional Services/project management/technologist professional	no reference to specific site area	
38113030662A	11/11/2013	CH2MHill	Reichhold Inc	9/28/2013–10/25/2013	\$246.90	For engineering services through October 25 2013: Duwamish assistance professional services/Project management	no reference to specific site area	
38113035427B	12/27/2013	CH2MHill	Reichhold Inc	10/26/2013–11/29/2013	\$3,111.81	For engineering services through November 29 2013: Reichhold Closure Professional Services/ project management, technologist professional, and expenses (outside services–Critigen)	no reference to specific site area	
38113035427A	12/27/2013	CH2MHill	Reichhold Inc	10/26/2013–11/29/2013	\$836.00	For engineering services through November 29 2013: Duwamish assistance professional services/Project management	no reference to specific site area	
38114000531	1/7/2014	CH2MHill	Reichhold Inc	11/30/2013–12/27/2013	\$5,890.84	For engineering services through December 27 2013: Reichhold closure professional services/project management	no reference to specific site area	
38114008741B	3/28/2014	CH2MHill	Reichhold Inc	2/1/2014	\$23,240.17	For engineering services through February 28 2014: Reichhold Closure Professional Services/ project management, technologist professional, Environmental Engineer and expenses (mileage, lodging, meals)	no reference to specific site area	
38114011705B	4/25/2014	CH2MHill	Reichhold Inc	3/1/2014	\$12,525.56	For engineering services through March 28 2014: Reichhold Closure Professional Services/ project management, technologist professional, Environmental Engineer	no reference to specific site area	



Table B8: CH2M Hill Invoice Summary
Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed	Cost not related to Glacier NW Uplands cleanup
38114011705A	4/25/2014	CH2MHill	Reichhold Inc	3/1/2014	\$520.82	For engineering services through March 28 2014: Duwamish Assistance Professional Services/Project management	no reference to specific site area	
38114013843B	5/19/2014	CH2MHill	Reichhold Inc	3/29/2014–4/25/2014	\$5,014.33	For engineering services through April 25 2014: Reichhold Closure Professional Services/ project management, technologist professional, hydrogeologist	no reference to specific site area	
38114013843A	5/19/2014	CH2MHill	Reichhold Inc	3/29/2014–4/25/2014	\$858.20	For engineering services through April 25 2014: Duwamish Assistance Professional Services/Project management	no reference to specific site area	
38114017822B	6/26/2014	CH2MHill	Reichhold Inc	4/26/2014 – 5/30/2014	\$4,357.54	For engineering services through May 30 2014: Reichhold Closure Professional services/Project management, technologist professional	no reference to specific site area	
38114017822A	6/26/2014	CH2MHill	Reichhold Inc	4/26/2014 – 5/30/2014	\$214.55	For engineering services through May 30 2014: Duwamish assistance professional services/Project management	no reference to specific site area	
38114020295A	7/18/2014	CH2MHill	Reichhold Inc	5/31/2014–6/27/2014	\$3,218.25	For engineering services through June 27 2014: Duwamish assistance professional services/Project management	no reference to specific site area	
38114020195B	7/18/2014	CH2MHill	Reichhold Inc	5/31/2014–6/27/2014	\$4,821.83	For engineering services through June 27 2014: Reichhold Closure Professional services/Project management, hydrogeologist, technologist professional	no reference to specific site area	
381002119A	8/26/2014	CH2MHill	Reichhold, Inc.	7/25/2014	\$939.97	For engineering services through July 25, 2014, including Duwamish Assistance	Seattle Terminal, no specific location referenced	
381002119B	8/26/2014	CH2MHill	Reichhold, Inc.	7/25/2014	\$2,534.69	For engineering services through July 25, 2014, including Reichhold Closure	Seattle Terminal, no specific location referenced	
381003887A	9/15/2014	CH2MHill	Reichhold, Inc.	9/5/2014	\$5,378.17	For engineering services through September 5, 2014 and estimated services through 9/30/14, including Duwamish Assistance	Seattle Terminal, no specific location referenced	
381003887B	9/15/2014	CH2MHill	Reichhold, Inc.	9/5/2014	\$18,201.88	For engineering services through September 5, 2014 and estimated services through 9/30/14, including Reichhold Closure	Seattle Terminal, no specific location referenced	
381006135B- Revised	10/3/2014	CH2MHill	Reichhold Inc	10/1/2014–10/31/2014	\$6,062.19	For engineering services from 10/01/2014 through 10/31/14: Reichhold Closure Professional services/Project management, technologist professional	no reference to specific site area	
381006135A	12/5/2014	CH2MHill	Reichhold, Inc.	11/28/2014	\$3,088.67	For engineering services through November 28, 2014, including Duwamish Assistance	Seattle Terminal, no specific location referenced	
38114008741A	3/28/2014	CH2MHill	Reichhold Inc	2/14/2014	\$886.58	For engineering services through February 28 2014: Duwamish Assistance Professional Services/Project management	no reference to specific site area	
total					\$616,745.55		total not upland related costs	\$74,064.62
minus non–uplands related co:					<u>\$542,680.93</u>			



Table B9: Anchor QEA Invoice Summary
Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed	Site Location/Geographical Reference where services were performed
34496	7/17/2013	Anchor QEA	Cal Portland	6/1/2013–6/30/2013	\$5,590.00	Professional Services: Review EPA's proposed cleanup plan	5900 West Marginal Way	Related to LDW Superfund Site allocation?
34942	8/23/2013	Anchor QEA	Cal Portland	7/1/2013–7/31/2013	\$1,994.00	Professional Services: Review EPA's proposed cleanup plan	5901 West Marginal Way	Related to LDW Superfund Site allocation?
41615	3/20/2015	Anchor QEA	Cal Portland	2/1/2015–2/28/2015	\$460.00	Professional Services: Review EPA's proposed cleanup plan	5901 West Marginal Way	Related to LDW Superfund Site allocation?
41821	4/9/2015	Anchor QEA	Cal Portland	3/1/2015–3/31/2015	\$8,440.00	Professional Services: Review EPA's proposed cleanup plan Review of Glacier– Reichhold site draft remedial investigation report Participation in client calls and meetings	5975 West Marginal Way	Related to LDW Superfund Site allocation?
42584	6/30/2015	Anchor QEA	Cal Portland	5/1/2015–5/31/2015	\$2,098.52	Professional Services: Review EPA's proposed cleanup plan Review of draft remedial investigation report for the 5900 West Marginal Way MTCA Site Participation in client calls and meetings.	5975 West Marginal Way	Related to LDW Superfund Site allocation?
42993–A	7/13/2015	Anchor QEA	Cal Portland	6/1/2015–6/30/2015	\$943.50	Professional Services: Review EPA's proposed cleanup plan Review of draft remedial investigation report for the 5900 West Marginal Way MTCA Site Participation in client calls and meetings.	5975 West Marginal Way	Related to LDW Superfund Site allocation?
43415	8/12/2015	Anchor QEA	Cal Portland	7/1/2015–7/31/2015	\$253.50	Professional Services: Review EPA's proposed cleanup plan Technical assistance scoping the 5900 West Marginal Way Site Feasibility Study with ERM Participation in client calls and meetings.	5975 West Marginal Way	Related to LDW Superfund Site allocation?
43806	9/11/2015	Anchor QEA	Cal Portland	8/1/2015–8/31/2015	\$1,518.50	Professional Services: Review EPA's proposed cleanup plan Technical assistance scoping the 5900 West Marginal Way Site Feasibility Study with ERM Participation in client calls and meetings.	5975 West Marginal Way	Related to LDW Superfund Site allocation?



Table B9: Anchor QEA Invoice Summary
Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed	Site Location/Geographical Reference where services were performed
44216	10/9/2015	Anchor QEA	Cal Portland	9/1/2015–9/30/2015	\$713.50	Professional Services: Review EPA's proposed cleanup plan	5975 West Marginal Way	Related to LDW Superfund Site allocation?
						Technical assistance scoping the 5900 West Marginal Way Site Feasibility Study with ERM		
						Participation in client calls and meetings.		
44561	11/10/2015	Anchor QEA	Cal Portland	10/1/2015–10/31/2015	\$483.50	Professional Services: Review EPA's proposed cleanup plan	5900 West Marginal Way	Related to LDW Superfund Site allocation?
						Technical assistance scoping the 5900 West Marginal Way Site Feasibility Study with ERM		
						Participation in client calls and meetings.		
45519	1/14/2016	Anchor QEA	Cal Portland	12/1/2015–12/31/2015	\$713.50	Professional Services: Review EPA's proposed cleanup plan	5900 West Marginal Way	Related to LDW Superfund Site allocation?
						Participation in client calls and meetings.		
57077	4/24/2018	Anchor QEA	Cal Portland	3/1/2018–3/31/2018	\$1,971.00	Preparation for participation in meeting with Ecology Review of Ecology comments and assistance with comment responses on the Draft Remedial Investigation Report	5900 West Marginal Way	
59026	9/19/2018	Anchor QEA	Cal Portland	8/1/2018–8/31/2018	\$7,737.75	Development of preliminary integrated cleanup/restoration strategies	5900 West Marginal Way	
						Treatability study planning		
59567	10/16/2018	Anchor QEA	Cal Portland	9/1/2018–9/30/2018	\$11,116.50	Further development of integrated cleanup/restoration strategies	5900 West Marginal Way	
						Development of treatability study work plans		
59932	11/15/2018	Anchor QEA	Cal Portland	10/1/2018–10/31/2018	\$4,643.25	Further development of integrated cleanup/restoration strategies	5900 West Marginal Way	
						Further development of treatability study work plans		
62947	6/18/2019	Anchor QEA	Cal Portland	5/1/2019–5/31/2019	\$27,946.06	Sediment sampling for treatability study	5900 West Marginal Way	
						Initiation of treatability study		
63389	7/16/2019	Anchor QEA	Cal Portland	6/1/2019–6/30/2019	\$10,932.93	Continuation of treatability study	5900 West Marginal Way	
63908	8/20/2019	Anchor QEA	Cal Portland	7/1/2019–7/31/2019	\$7,742.25	Review of draft cleanup level memo and participation in client/consultant meeting	5900 West Marginal Way	
						Continuation of treatability study		
64080	9/10/2019	Anchor QEA	Cal Portland	8/1/2019–8/31/2019	\$883.00	Participation in client/consultant/Ecology meeting	5900 West Marginal Way	
64580	10/10/2019	Anchor QEA	Cal Portland	9/1/2019–9/30/2019	\$1,611.50	Review of preliminary feasibility study alternatives	5900 West Marginal Way	
						Participation in client/consultant meetings and calls		
65122	11/14/2019	Anchor QEA	Cal Portland	10/1/2019–10/31/2019	\$6,427.50	Development of preliminary feasibility study alternatives	5900 West Marginal Way	
						Preparation for and participation in Ecology meeting		
						Participation in client/consultant meetings and calls		



Table B9: Anchor QEA Invoice Summary
Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed	Site Location/Geographical Reference where services were performed	
65674	12/18/2019	Anchor QEA	Cal Portland	11/1/2019–11/30/2019	\$1,351.50	Review of draft remedial investigation report sections□ Development of preliminary feasibility study alternatives Participation in client/consultant meetings and calls	5900 West Marginal Way		
66138	1/20/2020	Anchor QEA	Cal Portland	12/1/2019–12/31/2019	\$8,601.75	Review of draft remedial investigation report sections Review of preliminary feasibility study alternatives Completion of treatability study Participation in client/consultant meetings and calls	5900 West Marginal Way		
66508	2/17/2020	Anchor QEA	Cal Portland	1/1/2020–1/31/2020	\$2,483.50	Review of draft remedial investigation report sections Review of preliminary feasibility study alternatives Participation in client/consultant meetings and calls	5900 West Marginal Way		
67028	3/17/2020	Anchor QEA	Cal Portland	2/1/2020–2/29/2020	\$2,943.00	Review of draft remedial investigation report sections Review of preliminary feasibility study alternatives Participation in client/consultant meetings and calls	5900 West Marginal Way		
67416	4/9/2020	Anchor QEA	Cal Portland	3/1–3/31/2020	\$19,000.13	Glacier Northwest Site	5900 West Marginal Way		
26 invoices					total cost	\$138,600.14			



Table B10: Preston Gates Ellis Invoice Summary
Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed
177539-00-20474	1/16/1991	Preston Gates Ellis	Lone Star	Billing period ending 12/31/1990	\$2,470.08	Meeting preparation, review of parametrix report, draft FOIA request, public records request, review of Phase II site assessment	W. Marginal Way
183900-00-20474	3/12/1991	Preston Gates Ellis	Lone Star	Billing period ending 2/28/1991	\$2,487.45	Review archived records at WDOE, office conference	W. Marginal Way
187074-87001	4/18/1991	Preston Gates Ellis	Lone Star	Billing period ending 3/31/1991	\$1,687.35	Analysis and review of Shannon & Wilson scope of work for West Marginal Way cleanup; further communications with Keith McGoffin's office. Telephone conference with Ed Owens. Advice and analysis of Ecology's proposed approach to site investigation and cleanup.	W. Marginal Way
190366-00-20474	5/10/1991	Preston Gates Ellis	Lone Star	Billing period ending 4/30/1991	\$2,463.70	Review Shannan & Wilson's Scope of Work for West Marginal Way investigation. Preparation of contract with Shannon & Wilson and scope of work for cleanup investigation. Coordinating study with Ecology. Analysis of DOE proposed approach regarding West Marginal Way. Consulting & Preparation of contract with Shannon & Wilson	W. Marginal Way
193867-00-20474	6/14/1991	Preston Gates Ellis	Lone Star	Billing period ending 5/31/1991	\$357.80	Analysis of Parametiix report and preparation of advice	W. Marginal Way
205044	9/13/1991	Preston Gates Ellis	Lone Star	Billing period ending 8/31/1991	\$168.30	Telephone conference with Ed Owens	W. Marginal Way
267266-87001	2/12/1993	Preston Gates Ellis	Lone Star	Billing period ending 2/12/1993	\$1,449.43	Telephone conference with Ed Owens. Review letter from Dept. of Army responding to West Marginal Way.	W. Marginal Way
267266-00-20474	2/12/1993	Preston Gates Ellis	Lone Star	Billing period ending 1/31/1993	\$1,315.32	Prepare notice of liability letter for W. Marginal Way to include the Army & MRI. Corporate headquarters research, for S. Carter. Final preparation of correspondence to PRPs regarding participation in, or lawsuits for costs of cleanup at W Marginal Way--Kaiser, Reichhold, U.S. Army, and Ifetals Recycling.	W. Marginal Way
270877-00-20474	3/18/1993	Preston Gates Ellis	Lone Star	Billing period ending 2/28/1993	\$253.80	Preparation of correspondence to Kaiser and Reichhold. Review of Scope of Work for remedial investigation and feasibility study for West Marginal Way property; Review of correspondence from Proler regarding property.	W. Marginal Way
275198-00-20474	4/15/1993	Preston Gates Ellis	Lone Star	Billing period ending 3/31/1993	\$774.10	Discussion with W. Chapman re contract and scope of work for W. Marginal Way facility. Review Shannon & Wilson Work Plan; Prepare schedule for RI/FS which includes administrative process and technical	W. Marginal Way
278552-00-20474	5/18/1993	Preston Gates Ellis	Lone Star	Billing period ending 4/30/1993	\$643.70	Preparation of schedule for investigation and cleanup; Prepare ' schedules for remedial action to enclose in letter to Reichhold. Prepare letter explaining schedules and strategy for involving Reichhold.	W. Marginal Way



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Table B10: Preston Gates Ellis Invoice Summary
Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed
282467-00-20474	6/14/1993	Preston Gates Ellis	Lone Star	Billing period ending 5/31/1993	\$312.00	Review letter from Beazer requesting information; Collect requested information for transmittal. Analysis of correspondence from Beazer and coordination with Shawn Carter Providing documentation and response to Beazer. Prepare response to Brazer (Kaiser) regarding liability at facility; Telephone conference with E. Owens	W. Mariginal Way
285983-00-20474	7/16/1993	Preston Gates Ellis	Lone Star	Billing period ending 6/30/1993	\$2,353.15	Research Reichhold Chemical for information necessary for complaint; Prepare CBRCLA and KrCA complaint for contribution. Telephone conference with Kaiser'S in-house attorney regarding Beazer allocation; Preparation of correspondence to Beazer. Finalze and transmit Reichhold complaint.	W. Mariginal Way
289472-00-20474,	8/17/1993	Preston Gates Ellis	Lone Star	Billing period ending 7/31/1993	\$400.64	Review of Reichhold correspondence answer and initiation of response. Review letter from Reichhold; collect materials for trasmission; Draft letter to Reichhold' Transmitting Parametrix report.	W. Mariginal Way
293048-00-20474	9/15/1993	Preston Gates Ellis	Lone Star	Billing period ending 8/31/1993	\$3,709.23	Strategy for preparation for, and negotiations with, Reichhold. Preparation of agenda and approach to meeting with Reichhold; premeeting with Shannon & Wilson and Ed Owens Follow up on Reichhold lead re review of library GAO materials regarding early 1980s report concerning Seattle area air pollution; review available online databases	W. Mariginal Way
310117-00-20474	10/15/1993	Preston Gates Ellis	Lone Star	Billing period ending 1/31/1994	\$1,086.43	Research and prepare answers to Reichhold' s counterclaims. Prepare affirmative defense; telephone conference with E. Owens regarding file and serve counterclaim answer and affirmative defenses; Begin preparation of answers to interrogatories. Telephone conference with S. Hoard re PNOCO used oil and request by transporter to use Lone Stare ID number for waste generated from tank cleaning. Prepare responses to interrogatories. Review and edit answers and objections to interrogatories; conference with S. Carter regarding same, Telephone conference with Reichhold's counsel regarding service of Lone Star's answer to counterclaim.	W. Mariginal Way



Table B10: Preston Gates Ellis Invoice Summary
Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed
299937-00-20474	11/11/1993	Preston Gates Ellis	Lone Star	Billing period ending 10/31/1993	\$833.78	Prepare cover letter transmitting complaint to Reichhold Prepare letter to Reichhold offering to negotiate and enclosing complaint; Conference with S. Carter regarding same. Further preparation of letter transmitting claim to Reichhold; Discussion with J. Bjorkman and W. Chapman Preparation of correspondence to Reichhold in anticipation of litigation.	W. Mariginal Way
303288-00-20474	12/15/1993	Preston Gates Ellis	Lone Star	Billing period ending 11/30/1993	\$1,565.40	Edit and finalize complaint; meeting with s. Carter and W. Chapman Finalize complaint, prepare civil cover sheet and summary and prepare for service; conference with S. Carter Discuss litigation strategy with J. Bjorkman and W. Chapman. Telephone conference with M. Schneider regarding complaint Joint status order review and preparation of correspondence to Ed Owens.	W. Mariginal Way
				total cost	\$24,331.66		



Table B11: Perkins Coie Group Invoice Summary
Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed
2557929	12/23/2003	Perkins Coie	Reichhold	through 11/30/2003	\$452.30	Review Shaw report on recent sampling compare to sampling and prior correspondence review Fluor contract	Seattle Site Cleanup
2590771	2/24/2004	Perkins Coie	Reichhold	through 1/31/2004	\$2,590.00	Telephone conference with Oldham Schmithorst Jeroue email to Issacson Leave message for Compeau on meetings email to Oidham Schmithorst Jeroue on status assess next steps Prepare for meeting with Shaw review key correspondence Telephone conferences with Compeau and Isaacson prepare for meeting with Shaw Meet with Jeroue Glacier and Shaw prepare for same	Seattle Site Cleanup
2605342	3/25/2004	Perkins Coie	Reichhold	through 2/29/2004	\$5,593.14	Review Shaw proposal telephone conference with Isaacson prepare draft email to Compeau forward same to Jeroue for review Review Shaw contract identify Shaw obligations Review Shaw proposal and past Shaw correspondence telephone 'conference with Oldham Schmithorst Jeroue regarding response Review email from Compeau review Shaw proposal compare to requirements of Shaw contract analysis of same Review correspondence conferences regarding contract issues Analysis of contractual obligations Review contract issues and language analyze open legal issues Telephone conference regarding cleanup issues Analysis of contractual obligations telephone conference with Isaacson regarding same Research and analysis on enforcement of Shaw contract telephone conference with Reichhold regarding same	Seattle Site Cleanup
2626572	4/30/2004	Perkins Coie	Reichhold	through 3/31/2004	\$1,615.90	Review Shaw letter on arsenic issues, prepare for Shaw meeting Meet with Reichhold and Shaw Telephone conference on Shaw issues	Seattle Site Cleanup
2641945	5/27/2004	Perkins Coie	Reichhold	through 4/30/2004	\$2,766.38	Review Shaw report on arsenic, analyze Shaw contract and prior scope of work determine Reichhold remedies against Shaw Prepare letter to Compeau Shaw Environmental forward same to Oldham Schmlthorst Jeroue review email from Compeau on ozone treatment emails with Jeroue on same Review correspondence to and from Shaw on ozone treatment system prepare letter to Shaw demanding resumption of treatment review contract with Shaw Review letter from Compeau forward to Reichhold review Shaw contract determine options Attempt to reach Isaacson review correspondence with Shaw on ozone treatment determine next steps Review correspondence on ozone treatment issues follow up on same	Seattle Site Cleanup



Table B11: Perkins Coie Group Invoice Summary
Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed
2663943	6/23/2004	Perkins Coie	Reichhold	through 5/31/2004	\$385.00	Review Shaw materials on ozone treatment and related issues	Seattle Site Cleanup
						Review correspondence to and from Shaw on ozone treatment	
2689197	7/30/2004	Perkins Coie	Reichhold	through 6/30/2004	\$420.00	Telephone conference discussing Shaw issues	Seattle Site Cleanup
						Review Shaw conceptual site model for arsenic	
2707468	8/26/2004	Perkins Coie	Reichhold	through 7/31/2004	\$315.00	Review recent correspondence on air compressor, review Shaw arsenic conceptual site model, telephone conference about possible characterization work	Seattle Site Cleanup
2945782	11/23/2004	Perkins Coie	Reichhold	through 10/31/2004	\$175.00	Telephone conference with Isaacson regarding seep sampling and other potential investigations	Seattle Site Cleanup
						Review correspondence with Shaw on ozone treatment and prospective sampling strategy on same	
3005454	2/24/2005	Perkins Coie	Reichhold	through 1/31/2005	\$324.00	Review CH2MHill proposed arsenic study plan propos revisions to same	Seattle Site Cleanup
3030760	3/24/2005	Perkins Coie	Reichhold	through 2/28/2005	\$216.00	Review correspondence with Compeau regarding operation of treatment system review contract with Shaws predecessors to determine Shaw obligations	seattle Site Cleanup
3088405	6/28/2005	Perkins Coie	Reichhold	through 5/31/2005	\$396.00	Review email correspondence with Shaw on groundwater sampling compare to prior Shaw communications on steps to obtain NFA	Seattle Site Cleanup
						Review CH2MHill proposal for arsenic investigation and NFA review correspondence with Shaw telephone conference	
3101085	7/27/2005	Perkins Coie	Reichhold	through 6/30/2005	\$324.00	Review CH2MHill scope of work to obtain No Further Action letter	Seattle Site Cleanup
3242902	3/28/2006	Perkins Coie	Reichhold	through 2/28/06	\$75.00	Review Annual Dangerous Waste Report prepare letter to Isaacson regarding same	Seattle Site Cleanup
3379219	10/31/2006	Perkins Coie	Reichhold	through 9/30/06	\$337.50	Review CH2MH1I1 proposed work plan, telephone conference	Seattle Site Cleanup
3519934	6/29/2007	Perkins Coie	Reichhold	through 5/31/07	\$395.00	Telephone conference with Isaacson counsel for Lone Star regarding remedial and development issues	Seattle Site Cleanup
						Email from Isaacson telephone conference with Oldham emails to Isaacson review agreement with Glacier	
3568885	8/28/2007	Perkins Coie	Reichhold	through 7/31/07	\$6,890.00	Prepare for and participate in call with Glacier	Seattle Site Cleanup
						Research process and requirements for No Further Action letter	
						Review analytical data direct analysis of options to obtain No Further Action Letter	
						Research regarding opinion letters from Department of Ecology	
						Review contract with Fluor telephone conference with Oldham regarding arsenic and penta issues emails	
						Research opinion letters from Department of Ecology regarding cleanup of soil and groundwater	
						Research opinion letters from Department of Ecology regarding cleanup of soil and groundwater	
						Analyze contract with Shaw telephone conference with counsel for Glacier	
						Research Department of Ecology opinion letters for soil and groundwater contamination prepare memorandum regarding same	
						review background documents reports and correspondence regarding Shaw Environmental cleanup actions	
						Review Fluor contract analysis of contract rights strategy and conference on No Further Action Letter	



Table B11: Perkins Coie Group Invoice Summary
Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed
						Review reports and correspondence regarding Shaw Environmental cleanup actions	
						Develop No Further Action letter approach	
						Analyze Shaw contractual obligations review timeline of remediation	
						Review documents and correspondence regarding Shaws performance	
						Email correspondence with Bjorkman regarding chronology of events and documentation in Shaw matter	
						Review Shaw contract and correspondence edit timeline of events to compel Shaw performance	
						Review historical materials direct preparation of site chronology	
3588912	9/27/2007	Perkins Coie	Reichhold	through 8/31/07	\$3,732.00	Review email and article from Isaacson direct analysis of same	Seattle Site Cleanup
						-Review reports forwarded by Glacier analysis of evidence on issues affecting further site clean up	
						Review deposition transcripts regarding potential disposal activities	
						-Review SAIC report strategy on potential response telephone conference with Glacier	
						-Review deposition transcripts regarding potential disposal activities	
						-Review deposition transcripts for regarding potential evidence of disposal activities	
						-Research and review Ecology documents regarding dredging conducted by Glacier	
						Review report regarding Glacier Bay Source Control Area and background documents	
						Telephone conference with Isaacson email to Oldham direct	
3599332	10/27/2007	Perkins Coie	Reichhold	through 9/30/07	\$2,528.00	-Telephone conference with Isaacson counsel for Glacier	Seattle Site Cleanup
						-Review Settlement Agreement review Warner deposition	
						-Telephone conference with Kossik regarding work to address arsenic contamination	
						-Research on prior depositions of Glacier experts	
						-Develop strategy to comply with Glacier settlement agreement direct analysis of historical materials relevant to site contamination	
						-Research on prior depositions	
						-Review Farlow deposition review Ecology documents regarding dredging conducted by Glacier NW	
						-Telephone conference with counsel for Glacier review complaint against Duwamish Shipyard and assess impact on Reichhold	
						-Telephone conference with Bjorkman regarding Settlement Agreement and CERCLA section 104e order send Settlement Agreement and attachments to Bjorkman	
3617732	11/30/2007	Perkins Coie	Reichhold	through 10/31/2007	\$830.50	-Review deposition transcript of Shields	Seattle Site Cleanup
						-Review deposition transcript of Shields	
						-Review Settlement Agreement for confidentiality provisions	
						-Telephone conference with Bjorkman counsel for Glacier review Glacier settlement agreement	
						-Analyze Glacier settlement agreement	
3635393	12/28/2007	Perkins Coie	Reichhold	through 11/30/2007	\$1,030.73	-Emails with Bjorkman review Lone Star settlement agreement	Seattle Site Cleanup
						-Review Pentachlorophenol and arsenic data strategy on next steps	
						-Review pentachlorophenol and arsenic data telephone conference with Oldham and Kossik	



Table B11: Perkins Coie Group Invoice Summary
Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed
3654832	1/29/2008	Perkins Coie	Reichhold	through 12/31/2007	\$1,318.00	-Review letter and documents from glacier strategy on response -Review Glaciers Section 104e response for confidential information analyze same and send email to Schneider -Review CH2MHill Scope of Work email to Oldham regarding same	Seattle Site Cleanup
3671662	2/28/2008	Perkins Coie	Reichhold	through 1/31/2008	\$3,595.00	-Telephone conference with Bjorkman review SAIC report -Review site data telephone conference with Oldham and Kossik -Review deposition transcripts for historical operations information in preparation for site visit with EPA -Review Shaw correspondence outline presentation to Ecology -Telephone conference with Ortiz Washington Department of Ecology regarding uplands cleanup review site documents -Telephone conference with Oldham and Shaw email with Glacier -Review lease document between U.S and Reichhold -Telephone conference with Bjorkman regarding lease documents -Review Shaw investigation and remedial documents -Emails with Ecologys Ortiz prepare for meeting with Glacier and Shaw -Research 1946 lease	Seattle Site Cleanup
3692544	3/28/2008	Perkins Coie	Reichhold	through 2/29/08	\$23,271.50	-Prepare for participate in and follow up on conference with Shaw Environmental and Glacier Northwest regarding remediation and Ecology site visit -Prepare for and meet with Glacier and Shaw -Review remediation documents in preparation for site visit with Ecology -Review historical documents folder -Review information from Glacier review Shaw materials direct review of deposition transcripts -Research 1946 lease review Lonestar documents -Review historical documents -Emails with Glacier telephone conference with Oldham review RI documents -Review Lonestar documents -Review and summarize remediation documents in preparation for disclosure to Ecology -Review survey and sampling report of seeps -Emails with Ecology Oldham and Shaw direct preparation of materials for upcoming meeting -Review Lonestar documents -Review Remedial Investigation report -Review Lonestar documents -Prepare for participate in and follow up on telephone conference regarding site visit review correspondence from Shaw and documents to be provided to Ecology -Review historical documents preparation -Review materials from Shaw telephone conference with Oldham telephone conference with Oldham Shaw and Glacier leave voicemail with Ecology -Review Lonestar documents prepare timeline -Review Lonestar documents prepare timeline -Review site materials on pentachlorophenol 0.90 Review site documents prepare for site visit	Seattle Site Cleanup



Table B11: Perkins Coie Group Invoice Summary
Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed
						<div>-Review Lonestar documents review technical reports -Prepare for attend and follow-up on site visit at Glacier facility -Prepare for participate in and follow up on site visit telephone conference with Oldham review arsenic information -Review Lonestar documents compile correspondence -Review Shaw documents -Review Lonestar documents -Emails with Shaw and Glacier on site issues outline presentation to Ecology -Review arsenic data telephone conference with Oldham and Kossik -Review Shaw correspondence and reports research RETEC reports -Review arsenic evaluation prepare timeline of site ownership and arsenic contamination review previous remedial action reports and memoranda regarding site contamination review Shaw and Ecology reports regarding same prepare chronology regarding same review Retec remedial investigation report -Review Shaw correspondence and reports -Review stormwater study review Retec remedial investigation report prepare chronology review Alston and Farlow depositions review the WA Dioxin Source Assessment report review prior Shaw Lone Star and Reichhold correspondence -Review historical site data outline next steps -Research Fluor GTI documents review National Archives indices for historic site information review Shaw correspondence -Prepare chronology regarding site contamination events review Compher Finch Guyot Herman Means Molvik Navarre and Shields depositions review prior Shaw Lone Star and Reichhold correspondence review Lower Duwamish Waterway Group seep survey data report review DOE Source Control Action Plan for Glacier Bay -Research 1946 lease -Review Shaw contract telephone conference with Oldham regarding next steps with Shaw -Review National Archives indices for historic site information coordinate site visits review Glaciers 104e response documents compile document date ranges</div>	Seattle Site Cleanup



Table B11: Perkins Coie Group Invoice Summary
Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed
3715195	4/28/2008	Perkins Coie	Reichhold	through 3/31/2008	\$14,224.19	-Review correspondence regarding upcoming Seattle site meeting review PLP letter regarding the Seattle Site telephone call with Schneider Bjorkman and Tesch regarding agenda for meeting conference with Schneider regarding Shaw chronology -Telephone conferences with Oldham Bjorkman Tesch review Ecology PCP letter -Correspondence with Kossik regarding arsenic contamination prepare for and attend site meeting with Shaw Glacier and Reichhold review 1999 EPA Site Investigation Report and seep data review PLP letter -Preparations for meeting with Shaw -Research and review site investigation and dioxin issues -Research and review site investigation and dioxin issues -Review Bjorkman correspondence regarding Ecology communications and case schedule correspondence with Schneider Oldham and Kossik regarding PLP response letter -Review Dalton deposition conference with Schneider regarding PLP response site history and the Seattle Site meeting review correspondence with Tesch regarding PLP response -Telephone conference with Kossik emails with Shaw and Glacier review PLP letter and attachments strategy on response outline next steps -Research and review previous site investigations and dioxin issues -Review ReTec Preliminary FS and previous PLP notice prepare for and participate in telephone conference with Reichhold Shaw Glacier and CH2MHill analyze GTI contracts and correspondence with Reichhold for arsenic clauses and contamination assumptions -Telephone conference with Shaw and Glacier telephone conference with Martin and counsel for Shaw review contract terms -Reviewing Retec Preliminary Feasibility Study -Telephone conference with Oldham and Kossik prepare letter to Shaw outline letters to Ecology direct preparation of letters -Review Retec Preliminary Feasibility Study review Dalton deposition review Oldham and Tesch correspondence regarding Shaw remediation work review the 1990 Parametrix Site Assessment review Patmont and Hime expert reports draft PLP waiver letter -Review historic documents compile reports for attorney review	Seattle Site Cleanup



Table B11: Perkins Coie Group Invoice Summary
Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed
3736660	5/30/2008	Perkins Coie	Reichhold	through 4/30/08	\$7,626.50	-Review Lone Star documents -Assemble RI/FS for Ecology correspondence with Schneider and Bjorkman regarding same update case file -Draft and send letter to Ecology enclosing RI/FS telephone conference with Bjorkman regarding same -Review and organize Lonestar documents and site reports -Review and organize Lonestar documents and site reports update files -Telephone conference with Tesch regarding draft site report preparation and deadlines report to Schneider regarding same -Telephone conference with Tesch regarding report deadline -Telephone conferences with Tesch regarding Ecology report and remaining remediation objectives prepare summary of Shaws position review Shaw correspondence regarding report summary -Review Shaw outline of report strategy and conference regarding same -Review prior reports review Shaw draft report assess next steps -Analyze and edit updated remedial activities summary report and attached data and figures correspondence with Tesch regarding report contents compare prior case correspondence and documents with remedial activities report prepare comments and analysis of remedial activities report -Review updated figures released by Shaw -Review Shaw report propose revisions to same telephone conference with Oldham -Review updated site figures and remediation analysis report prepare for and attend telephone conference with Kossik regarding comments and issues with remediation analysis report correspondence with Tesch regarding report comments and upcoming deadlines analyze case pleadings from 1994-95 and historical records from 1945-1960 -Review Shaw report propose revisions to same telephone conference with Kossik Analyze Lone Star case pleadings and plant records from 1945-60 Analyze CH2M Hill and Glacier Northwest comments on the remedial activities report review remedial	Seattle Site Cleanup



Table B11: Perkins Coie Group Invoice Summary
Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed
3755177	10/1/2008	Perkins Coie	Reichhold	through 8/31/08	\$1,809.00	-Telephone conference and correspondence with Tesch regarding final remedial activities summary report update case file -Correspondence with Shaw Glacier Reichhold and CH2MHill regarding report delivery to Ecology review CD of appendices -Correspondence with Ortiz regarding Remedial Activities Summary Report and Ecology meeting -Emails to Ortiz and team -Review Ecology initiative on Duwamish telephone conference with Tesch emails with team and Glacier to set up meeting with Ecology -Emails with Ecology Shaw and Glacier prepare for Ecology meeting -Emails with Ecology Shaw and Glacier telephone conference with Glacier -Review Shaw report telephone conference with Tesch -Telephone conferences with Oldham and Tesch on contract issues review Shaw report -Voice mail with Ortiz review shaw report	Seattle Site Cleanup



Table B11: Perkins Coie Group Invoice Summary
Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed
3777329	7/31/2008	Perkins Coie	Reichhold	through 6/30/08	\$26,164.71	-Voice mail from Bjorkman review Shaw report telephone conference with Oldham -Review Reichhold-Lone Star settlement agreement corporate purchase agreement GTI correspondence and preliminary feasibility study for impacted soil excavation authorizations -Analysis of Glacier obligation under settlement agreement -Research Washington and federal case law regarding excavation cost allocations for non-contaminated soil -Analyze CERCLA case law regarding cost recovery actions for prepatory excavation work review case file for site reports and correspondence to send to Ecology telephone conference with Bjorkman and Schneider regarding Ecology meetings review Glaciers 104e productions to Ecology -Telephone conference with Ortiz prepare draft agenda direct review of historical documents telephone conference with Bjorkman email to Kossik -Review and analyze historical site remediation reports correspondence and presentations prepare collection of reports and correspondence for Ecology correspondence with Bjorkman and Schneider regarding independent remedial action certification analyze depositions and prior site reports regarding pentachlorophenol presence in site lagoons and settling ponds Assemble documents for Ecology -Prepare and review document production to Ecology prepare table of contents for document production telephone conferences and meeting with production group regarding production -Review Warner deposition Reichhold Seattle Pollution Report and historical Seattle Pollution Commission correspondence regarding penta impoundment prepare collection of reports and correspondence for Ecology correspondence with Bjorkman and Schneider regarding same meetings and correspondence with production team regarding same telephone conference and correspondence with Ortiz regarding Ecology meeting agenda and document production prepare for and attend meeting with Schneider Kossik Tesch Bjorkman and Oldham regarding Ecology presentation research CERCLA case law regarding excavation costs 06/09/08 Schneider 2.30 Meet with Oldham Kossik Shaw and Glacier prepare for same	Seattle Site Cleanup



Table B11: Perkins Coie Group Invoice Summary
Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed
3816901	9/30/2008	Perkins Coie	Reichhold	8/31/2008	\$7,837.97	-Review and analyze proposed contract finalize memorandum and corn ments -Analyze Shaws proposed master services agreement meeting and correspondence with Dial and Schneider regarding overhauling same review Dials memorandum and mark-up regarding master services agreement changes -Conference regarding comments to proposed contract -Strategy and conference on Shaw contract issues -Analyze Reichhold standard service agreement -Email correspondence review Reichhold form contract analyze issues -Telephone conference and correspondence with Tesch regarding draft sampling plan and Fridays conference call -Telephone conference with Schneider Oldham Tesch Coppel and Patmont regarding sampling analysis plan proposed work schedule and site issues telephone conferences with Bjorkman and Tesch regarding equipment and gravel barriers issues review Glacier/Reichhold Settlement Agreement regarding Glaciers assistance obligations -Participate in team call address Shaw contract issues -Telephone conference with Tesch regarding Glacier site and well sampling events -Telephone conference with Kossik Oldham Tesch Coppel Bjorkman and Patmont regarding sampling analysis plan agreed order updates and monitoring well status conference on contract review Shaws well status summary and updated sampling analysis plan -Telephone conference with Oldham regarding Shaw contract issues conference regarding same -Correspondence with Bjorkman and Schneider regarding Glaciers concerns with Shaws proposed contract review same -Telephone conference with Tesch Coppel Bjorkman and	Seattle Site Cleanup



Table B11: Perkins Coie Group Invoice Summary
Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed
3838509	12/2/2008	Perkins Coie	Reichhold	through 10/31/2008	\$26,811.00	-Review and analyze proposed contract finalize memorandum and corn ments -Analyze Shaws proposed master services agreement meeting and correspondence with Dial and Schneider regarding overhauling same review Dials memorandum and mark-up regarding master services agreement changes -Conference regarding comments to proposed contract -Strategy and conference on Shaw contract issues -Analyze Reichhold standard service agreement -Email correspondence review Reichhold form contract analyze issues -Telephone conference and correspondence with Tesch regarding draft sampling plan and Fridays conference call -Telephone conference with Schneider Oldham Tesch Coppel and Patmont regarding sampling analysis plan proposed work schedule and site issues telephone conferences with Bjorkman and Tesch regarding equipment and gravel barriers issues review Glacier/Reichhold Settlement Agreement regarding Glaciers assistance obligations -Participate in team call address Shaw contract issues -Telephone conference with Tesch regarding Glacier site and well sampling events -Telephone conference with Kossik Oldham Tesch Coppel Bjorkman and Patmont regarding sampling analysis plan agreed order updates and monitoring well status conference on contract review Shaws well status summary and updated sampling analysis plan -Telephone conference with Oldham regarding Shaw contract issues conference regarding same -Correspondence with Bjorkman and Schneider regarding Glaciers concerns with Shaws proposed contract review same -Telephone conference with Tesch Coppel Bjorkman and	Seattle Site Cleanup



Table B11: Perkins Coie Group Invoice Summary
Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed
3862257	12/31/2008	Perkins Coie	Reichhold	through 11/30/08	\$29,194.50	-Review and analyze proposed contract finalize memorandum and corn ments -Analyze Shaws proposed master services agreement meeting and correspondence with Dial and Schneider regarding overhauling same review Dials memorandum and mark-up regarding master services agreement changes -Conference regarding comments to proposed contract -Strategy and conference on Shaw contract issues -Analyze Reichhold standard service agreement -Email correspondence review Reichhold form contract analyze issues -Telephone conference and correspondence with Tesch regarding draft sampling plan and Fridays conference call -Telephone conference with Schneider Oldham Tesch Coppel and Patmont regarding sampling analysis plan proposed work schedule and site issues telephone conferences with Bjorkman and Tesch regarding equipment and gravel barriers issues review Glacier/Reichhold Settlement Agreement regarding Glaciers assistance obligations -Participate in team call address Shaw contract issues -Telephone conference with Tesch regarding Glacier site and well sampling events -Telephone conference with Kossik Oldham Tesch Coppel Bjorkman and Patmont regarding sampling analysis plan agreed order updates and monitoring well status conference on contract review Shaws well status summary and updated sampling analysis plan -Telephone conference with Oldham regarding Shaw contract issues conference regarding same -Correspondence with Bjorkman and Schneider regarding Glaciers concerns with Shaws proposed contract review same -Telephone conference with Tesch Coppel Bjorkman and	



Table B11: Perkins Coie Group Invoice Summary
Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed
3879415	12/26/2008	Perkins Coie	Reichhold	through 11/30/2008	\$20,128.01	-Review and analyze proposed contract finalize memorandum and corn ments -Analyze Shaws proposed master services agreement meeting and correspondence with Dial and Schneider regarding overhauling same review Dials memorandum and mark-up regarding master services agreement changes -Conference regarding comments to proposed contract -Strategy and conference on Shaw contract issues -Analyze Reichhold standard service agreement -Email correspondence review Reichhold form contract analyze issues -Telephone conference and correspondence with Tesch regarding draft sampling plan and Fridays conference call -Telephone conference with Schneider Oldham Tesch Coppel and Patmont regarding sampling analysis plan proposed work schedule and site issues telephone conferences with Bjorkman and Tesch regarding equipment and gravel barriers issues review Glacier/Reichhold Settlement Agreement regarding Glaciers assistance obligations -Participate in team call address Shaw contract issues -Telephone conference with Tesch regarding Glacier site and well sampling events -Telephone conference with Kossik Oldham Tesch Coppel Bjorkman and Patmont regarding sampling analysis plan agreed order updates and monitoring well status conference on contract review Shaws well status summary and updated sampling analysis plan -Telephone conference with Oldham regarding Shaw contract issues conference regarding same -Correspondence with Bjorkman and Schneider regarding Glaciers concerns with Shaws proposed contract review same -Telephone conference with Tesch Coppel Bjorkman and	Seattle Site Cleanup



Table B11: Perkins Coie Group Invoice Summary
Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed
3898586	1/26/2009	Perkins Coie	Reichhold	through 2/28/09	\$11,715.00	Correspondence with Oldham Lilley and Tesch regarding Port of Seattle site investigation license telephone conference with Ridgley regarding same correspondence with Tesch and Oldham regarding PLP issues correspondence with Bjorkman and Tesch regarding Carlisle Lumber and other PLP identifications -Correspondence with Tesch and Bjorkman regarding NCP compliance and CERCLA issues meeting with Bjorkman Tesch Kossik and Ipsen regarding PRP litigation strategies case overview and timeline collecting historical data analyzing site aerials and next steps research and review PRP data regarding Carlisle Lumber Crown Zellerbach and Duwamish Shipyards Review draft access agreement propose revisions to same Review Lower Duwamish Waterway list of 104e recipients briefly research corporate histories for arsenic production Tesch and Kossik regarding PLP strategies next steps Port access agreement sampling analysis plan and updated work release telephone conference with Oldham regarding same and Duwamish Shipyards issues review ERM strategic risk mitigation plan correspondence with Kossik and Oldham regarding Asarco fallout on Glacier Bay and Lower Duwamish Waterway correspondence with Bjorkman regarding Port issues review ERM revised work release analyze Johnson response to proposed agreed order revisions correspondence with Oldham Lilley Tesch	Seattle Site Cleanup



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Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed
3917261	5/5/2009	Perkins Coie	Reichhold	through 3/31/09	\$26,616.39	Correspondence with Tesch and Ipsen regarding SAP and corporate purchase agreement language Research and review state and federal case law regarding claims for negligence private and public nuisance trespass and strict liability arising from prior owners disposal of hazardous waste prepare outline regarding same Research site ownership issues related to Hanson and Kaiser Telephone conference with Oldham regarding Agreed Order revision contribution strategies and draft sampling and analysis plan review 1993 and 1994 historical correspondence files for Reichhold and Lone Star PRP notices Analyze potential contribution rights telephone conference with Bjorkman regarding potential contribution review Scope of Work -Review 1995-1998 historical correspondence files for Reichhold PRP notices and former PRPs employee interviews correspondence with Schneider regarding same analyze McMillan Associates interview notes from former Kaiser and Lone Star employees regarding slurry pond contamination telephone conference with Oldham Lilley Bjorkman Kossik Tesch and Schneider regarding draft sampling and analysis plan ecology updates drum and dioxin sampling and PRP investigations telephone conferences with Oldham and Kossik regarding PRP investigations -Telephone conference with Oldham CH2MHill ERM Exstrom Glacier on Agreed Order Scope of Work and PLP issues -Research PLP letters from early 1990s -Review Ecology files for past PLP notices -Telephone conference with Guastafarro regarding PLP and independent remedial action notice letters review ERM updated draft sampling and analysis plan and project call summary analyze EPA site history timeline and Port of Seattle Terminal 115 PLP	Seattle Site Cleanup
3938957	3/27/2009	Perkins Coie	Reichhold	through 2/28/09	\$13,944.67	Attorney Services	Seattle Site Cleanup
3957387	5/5/2009	Perkins Coie	Reichhold	through 3/31/2009	\$12,320.29	Attorney Services	Seattle Site Cleanup



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Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed
3975840	6/4/2009	Perkins Coie	Reichhold	through 4/30/09	\$24,456.60	Analyze deposition testimony of Tea Repman Pauly Patricelli Partitt Owens and Navarre and exhibits thereto regarding past operators on the property prepare outline regarding same correspondence with Tesch regarding Ecology public records requests and conference call agenda -Review Ecology and ERM correspondence regarding groundwater sampling event and data issues telephone conference with Oldham Lilley Ipsen Kossik Tesch and Schneider regarding Ecology sampling clarifications public participation plan drum requests site history reports public records requests and lab data review Seattle Public Utilities public records response review EPAs response to FOIA request for Port of Seattle 104e request documents correspondence with Kossik Schneider Tesch and Oldham regarding same correspondence with Johnson Tesch and Bjorkman regarding Ecology public records requests -Telephone conference with Oldhman Kossik Exstrom Glacier and Shaw -Correspondence with Tesch and Kossik regarding Seattle Public Utilities response to public records request telephone conference with Tesch regarding same Duwamish Shipyards and Port of Seattle MTCA documents and summarizing Ecology revisionist tendencies draft public records requests to Ecology regarding Duwamish Shipyards and Port of Seattle MTCA documents correspondence with Oldham Tesch Schneider Kossik and Bjorkman regarding Ecology Agreed Order response signing decision reservation of rights language and EPA response to Terminal 115 FOIA request research Lower Duwamish Waterway Group 104e request issue review ERM report regarding Lower Duwamish Waterway cleanup conference -Telephone conferences with Oldham regarding signing agreed order agreed order terms enforcement order issues and Glaciers position analyze Ecologys proposed agreed order scope of work and schedule draft letter to Seattle Public Utilities regarding public records	Seattle Site Cleanup



Table B11: Perkins Coie Group Invoice Summary
Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed
3997801	6/25/2009	Perkins Coie	Reichhold	through 5/31/2009	\$9,095.70	-Review Ecology document production correspondence with Johnson regarding agreed order issue -Telephone conference and correspondence with Johnson regarding agreed order process and approval correspondence with Oldham nd telephone conference with Bjorkman regarding agreed order changes review ERM project call summary -Analyze and organize Ecology document production prepare same for scanning and production telephone conferences and correspondence with Oldham and Bjorkman regarding public participation plan site name and agreed order issues correspondence with Schneider and Oldham regarding agreed order submittal -Scan and prepare Port of Seattle Terminal 115 and Duwamish Shipyard documents for production -Consolidate and review Port of Seattle Duwamish Shipyards and MRI document scanning production correspondence and telephone conference with Lou Maag regarding same telephone conferencewith Oldham Lilley Bjorkman Kossik Tesch and Ipsen regarding LDW draft FS agreed order submittal site name change public participation plan SCAP updates and arsenic data telephone conferences with Bjorkman Lilley and Oldham regarding site name change denial and agreed order issue draft agreed order document package submittal letter prepare same for delivery to Ecology -Continue preparation of Port of Seattle Terminal 115 and Duwamish Shipyard documents for production -Correspondence with Ortiz and Johnson regarding public notice period and Ecology agreed order approval organize and prepare Duwamish Shipyards Port of Seattle and MRI electronic document collection for delivery draft letter to Tesch regarding same -Follow-up on details regarding document production -Telephone conferences with Oldham and Kossik regarding mailing lists revised ERM project team project management expectations and issues and courtesy review of public involvement document correspondence with Ortiz Bjorkman Ipsen Oldham and Kossik regarding public involvement document edits analyze and redline public involvement document review ERM and CH2MHill edits to public involvement document review Ecology public notice document -Telephone conference with Ipsen regarding project management team change and Ecology submittals correspondence with Oldham Ipsen Kossik and Lilley regarding Ecology public involvement document issues and redline submittal prepare submittal strategy for	Seattle Site Cleanup



Table B11: Perkins Coie Group Invoice Summary
Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed
4017799	7/30/2009	Perkins Coie	Reichhold	through 6/30/09	\$3,827.07	Review Ecology display advertisement regarding Glacier Site correspondence with Ipsen and Kossik regarding same -Review ERM conference call agenda and agreed order schedule -Telephone conference with Oldham Lilley Bjorkman Kossik Tesch Schneider and Ipsen regarding Ecology communications Glacier Westside and SCAP amendments upcoming meetings and public notice issues telephone conference with Oldham regarding ERM consultant switch and Lower Duwamish Waterway issues review Glacier Westside document proposed edits and ERM call summary correspondence with Ipsen regarding same -Participate in team call with Oldham Kossik ERM and Glacier -Review Ecologys site public notice document correspondence with Ipsen regarding same -Telephone conference with Oldham Schneider Lilley Bjorkman Kossik Tesch and Ipsen regarding Glacier Westside document and Ecology communications review Glacier Westside document comments prepare source outline for same review Ecology Data Gaps and SCAP source documents correspondence with Regan regarding Ecology document production -Participate in call with Oldham Kossik ERM and Glacier -Telephone conference with Oldham regarding Lilley attomey/technical consultant issue telephone conferences with Ipsen regarding redline comments to Glacier Westside document draft letter regarding City of Seattle public records production prepare same and technical documents for delivery review City of Seattle sampling hits -Review ERM submittal of comments to Glacier Westside document -Analyze and edit final public participation plan review project call summary -Review ERM telephone conference agenda Site Register update and	seattle Site Cleanup



Table B11: Perkins Coie Group Invoice Summary
Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed
4032838	9/3/2009	Perkins Coie	Reichhold	through 7/31/09	\$2,698.50	<p>Telephone conference with Oldham Lilley Bjorkman Kossik Tesch Schneider and Ipsen regarding EPA document dioxin/furan sampling issues and public participation plan errors review ERM site progress report and Ecology Site Register entry</p> <p>-Review ERM report telephone conference with Oldham Kossik ERM and Glacier</p> <p>-Review ERM draft baseline groundwater sampling sections and outline of data gaps report telephone conference with Oldham Lilley Bjorkman Kossik Schneider and Ipsen regarding Ecology meeting agreed order public review process soil removal interim action and storm sewer investigation issues review ERM agenda and call summary</p> <p>-Review Reichhold 104e production telephone conference with Oldham Lilley Bjorkman Schneider Kossik Tesch and Ipsen regarding Ecology meeting outfall issue terminal 115 and Port of Seattle agreed orders telephone conferences with Ipsen and Kossik regarding 104e production Warner report and deep outfall issue</p> <p>-Telephone conference with Oldham Kossik ERM Glacier on Agreed Order issues</p> <p>-Correspondence with Oldham Bjorkman and Lilley regarding Warner 1958 pollution report review Reichholds 104e response and supporting documents</p> <p>-Analyze Duwamish Shipyard agreed order compare Reichhold/Glacier agreed order requirements</p> <p>-Review and compare Duwamish Shipyards Work Plan</p> <p>-Review Duwamish Shipyard Work Plan requirements telephone conference with Oldham Schneider Bjorkman Kossik Tesch and Ipsen regarding Duwamish Shipyards documents Ecology negotiations and dioxin findings</p> <p>-Participate in call with Oldham Kossik Exstrom ERM and</p>	Seattle Site Cleanup



Table B11: Perkins Coie Group Invoice Summary
Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed
4080252	12/8/2009	Perkins Coie	Reichhold	through 10/31/09	\$2,425.00	Telephone conference with Kossik regarding data gaps report review same -Telephone conference with Kossik regarding Data Gaps Report Reichhold perspective telephone conferences with Ipsen regarding same and sediment commentary issues analyze Data Gaps Repoift prepare comments regarding same Telephone conference with Oldham regarding Data Gaps Report and group conferences analyze Data Gaps Report and prepare comments regarding same correspondence with Kossik regarding Data Gaps Report comments and analysis -Telephoneconferencewith Oldham Lilley Bjorkman '-Kossik and Tesch regarding data gaps report progress and comments and sampling issues telephone conference with Ko\$ik regarding executive summary and sediment sampling issues reviefri ERM conference call agenda analyze updated sediment data gapsTelephone conference with Oldham Lilley Bjorkman Kossik and Tesch regarding Data Gaps report issues review Reichhold comments regarding same -Review files for Ecology PRP letters correspondence with Tesch Ipsen and Kossik regarding same -Telephone conference with Oldham Lilley Bjorkman Kossik Tesch and Ipsen regarding Data Gaps Report executive summary and ecology issues	Seattle Site Cleanup
4095470	12/29/2010	Perkins Coie	Reichhold	through 11/30/09	\$75.00	Review public records request histories correspondence with Kossik regarding public records requests to the US Army	
4130918	2/28/2010	Perkins Coie	Reichhold	through 2/23/2010	\$978.50	-Telephone conference with Jeroue regarding correspondence with Field Corporation -Review file regarding Field Corporation encroachment -Telephone conference with Oldham complete review of file prepare documents to be sent to Jeroue -Email correspondence regarding Fields Corporation	Seattle Site Cleanup
45 invoices				total cost	\$301,524.55		

3030735	3/24/2005	Perkins Coie	Reichhold	through 2/28/2005	\$1,080.00	Telephone conference with CH2MHill regarding financial assurance FS work plan and related issues	Seattle Site Cleanup
						Telephone conference with CH2MHill regarding Ecology issues financial assurance risk-based clean-up levels and other subjects	
						Telephone conference with CH2MHill regarding financial assurance Ecology meeting and other items review message from EPAs McDonald on EPAs financial assurance concerns review regulations develop strategy to resolve EPA concerns telephone conference with Wildman	
2663930	6/23/2004	Perkins Coie	Reichhold	through 5/31/2004	\$608.00	Email correspondence conference regarding latest guidance on financial assurance review file	Seattle Site Cleanup



Table B12: Ater Wynne Invoice Summary
Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed	% of total cost not related to Glacier Uplands cleanup
1088613	11/11/2008	Ater Wynne	Reichhold	10/17/2008–10/31/2008	\$5,413.50	Analysis of 104e client response, analyze FOIA, various correspondence and meetings	LDW Superfund	\$5,413.50
1089258	12/4/2008	Ater Wynne	Reichhold	11/3/2008–11/21/2008	\$2,226.50	Analysis of 104e submittals, legal research regarding CERCLA/RCRA liability, various correspondence and meetings	LDW Superfund	\$2,226.50
1090351	1/22/2009	Ater Wynne	Reichhold	12/5/2008	\$219.00	pending NRDA issues at Lower Duwamish, file review, Glacier file documents, various correspondence and meetings	LDW Superfund	\$219.00
1091290	2/24/2009	Ater Wynne	Reichhold	1/20/2009–1/27/2009	\$730.00	evaluation of aerial photographs general information concerning development of the Glacier Bay site and related issues, various correspondence and meetings	LDW Superfund, Glacier site	
1091778	3/19/2009	Ater Wynne	Reichhold	2/3/2009–2/4/2009	\$4,124.50	review background data and history of Glacier Bay property analyze documents, Glacier Property, status of Ecology uplands work, identified dischargers to Glacier Bay, dioxin and arsenic sampling completed by EPA in the Waterway, site visit, various correspondence and meetings	LDW Superfund, Glacier site	
1092490	4/17/2009	Ater Wynne	Reichhold	3/4/2009–3/20/2009	\$11,411.07	analysis of Lower Duwamish Waterway LDW Source Control Action Plan for Glacier Bay Source Control Area, Glacier NW property discussions (boundary, site survey), meeting with Ecology, various correspondence and meetings	LDW Superfund	
1093386	5/26/2009	Ater Wynne	Reichhold	4/6/2009–4/30/2009	\$4,134.00	Inquiry from client concerning state administrative order, discuss and develop strategy for work with Ecology and Glacier N.W, review reports, various correspondence and meetings	LDW Superfund	
1094502	7/15/2009	Ater Wynne	Reichhold	6/2/2009	\$438.00	Conduct research concerning scope of potential federal liability for in-water investigation and remediation, receive inquiry from ERM, prepare files, various correspondence and meetings	LDW Superfund	
1095888	9/15/2009	Ater Wynne	Reichhold	8/19/2009–8/21/2009	\$2,208.25	review work history, strategy to gain approval to decommission historical stormwater system, analyze ERM correspondence, various correspondence and meetings	LDW Superfund	
1096747	10/16/2009	Ater Wynne	Reichhold	9/14/2009–9/30/2009	\$7,127.50	Discuss shipyard work plan, work performed by Anchor, Research issues related to conflicts in joint defense agreement context, review status of data gaps report and figures of historical arsenic pentachlorophenol in soil and stormwater system at Glacier NW property, various correspondence and meetings	LDW Superfund	
1097238	11/10/2009	Ater Wynne	Reichhold	10/8/2009–10/30/2009	\$24,339.50	Analyze draft data gaps report, stormwater system investigation prepared by ERM, analyze historical operations by Reichhold, discuss scope of her work in uplands including three adjacent properties the submission of the Port of Seattle's T-1 15 work plan, various correspondence and meetings	LDW Superfund	



Table B12: Ater Wynne Invoice Summary
Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

Invoice No.	Invoice Date	Issuing Party	Recipient	Date of Services	Invoice Amount \$	Description of Services invoiced	Site Location/Geographical Reference where services were performed	% of total cost not related to Glacier Uplands cleanup
1097866	12/8/2009	Ater Wynne	Reichhold	11/1/2009–11/23/2009	\$18,806.50	discuss source control implications for Glacier/Reichhold site, discuss data gaps report, groundwater sampling issues, various investigations of dredge events and placement of materials on Port and Glacier properties, review documents from consultants site, various correspondence and meetings	LDW Superfund	
1098678	1/13/2010	Ater Wynne	Reichhold	12/1/2009–12/29/2009	\$7,671.32	Review ERM correspondence with Ecology concerning ERM invoice, discuss Reichhold proposed changes to draft letter, Ecology recovery of costs, discuss Ports likely contribution to contaminants in the Bay, discuss groundwater contour map and groundwater system at Glacier Reichhold site, challenge to state expenses strategy for completing work, various correspondence and meetings	LDW Superfund	
1099954	2/10/2010	Ater Wynne	Reichhold	1/4/2010–1/28/2010	\$9,332.00	Complete review of Port T-115 data, discuss myriad sources of dioxins and furans in Lower Duwamish Waterway sediments and proposals for attempting to identify or eliminate sources of same, Conduct legal research concerning privileged communications and dispute resolution, various correspondence and meetings	LDW Superfund	\$9,332.00
1100327	3/23/2010	Ater Wynne	Reichhold	2/2/2010–2/25/2010	\$10,619.00	Analyze 1995 Settlement Agreement provision concerning remediation of property scope of work remedial action costs incurred by parties to the agreement effect of Ecology issuance of no further action determination, various correspondence and meetings, legal research, discuss seep sampling ground water sampling core samples and location of seep sampling from all sampling events	LDW Superfund	\$15,055.50
1100845	4/16/2010	Ater Wynne	Reichhold	3/1/2010–3/25/2010	\$15,055.50	various correspondence and meetings, legal research, discuss ground water monitoring, discuss strategy to complete Agreed Order work under Ecology supervision prior to ROD in LDW Superfund site, analyze settlement agreement	LDW Superfund	
1101385	5/14/2010	Ater Wynne	Reichhold	4/2/2010–4/29/2010	\$4,075.00	Update access agreement, discuss SAP/QAPP for groundwater monitoring and schedule for field work, various correspondence and meetings, analyze each issue related to MTCA	LDW Superfund	
1102243	6/15/2010	Ater Wynne	Reichhold	5/4/2010–5/27/2010	\$6,929.75	analyze Glacier/Trustees Consent Decree for the Hylebos Waterway in Commencement Bay, discuss lab and field work issues, analyze report from ERM regarding groundwater sampling results, discuss natural resources inquiry by Glacier discuss modified RI Work Plan outline	LDW Superfund	
1102699	7/12/2010	Ater Wynne	Reichhold	6/02/2010–6/30/2010	\$3,081.00	discuss possible modeling to evaluate sediment loading at Glacier Reichhold Site, discuss the new preliminary surface sediment dioxin/furan data and ramifications for Glacier/Reichhold site, analyze various correspondence	LDW Superfund	



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Evaluation of Liability for Past Investigation and Remediation Costs at the Glacier Northwest Property

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1103463	8/19/2010	Ater Wynne	Reichhold	7/1/2010–7/28/2010	\$10,736.00	Discuss 104e responses, correspondence with ERM and Ecology, review Administrative Order Amendment provisions	LDW Superfund	\$10,736.00
1103791	9/8/2010	Ater Wynne	Reichhold	8/2/2010–8/26/2010	\$11,892.00	Analyze responses to Ecology comments on data gap report, prepare invoices, various correspondence and meetings, discuss photographs provided by Ecology concerning site development, analyze T-115 documents, draft LDW SLVs	LDW Superfund	
1104579	10/20/2010	Ater Wynne	Reichhold	9/1/2010–9/30/2010	\$19,951.94	Various correspondence and meetings, analyze correspondence, analyze invoices, report on site visit with Ecology Project Manager, discuss groundwater sampling, discuss aerial photos of Glacier property, Lone Star litigation, Analyze supplemental 104e information request from EPA, analyze depositions	LDW Superfund	
1105448	11/21/2010	Ater Wynne	Reichhold	10/1/2010–10/28/2010	\$15,084.38	Various correspondence and meetings, analyze various correspondence, discuss litigation documents and EPA 104e supplemental information request, discuss Glacier agreement that arsenic source on Glacier site is fill material, analyze depositions, evaluation of litigation files, discuss status of groundwater sampling field work underway and schedule for completion discuss RI/FS draft work plan review research on and selection of labs	LDW Superfund	
1105863	12/16/2010	Ater Wynne	Reichhold	11/3/2010–11/29/2010	\$8,993.00	discuss draft work plan comments discuss arsenic sources and potential impacts contaminant pathways arsenic in cement mixtures, various correspondence and meetings, analyzing pleadings from Lone Star litigation and evaluate potential response to 104e request,	LDW Superfund	\$8,993.00
1106425	1/20/2011	Ater Wynne	Reichhold	12/1/2010–12/30/2010	\$19,669.56	analyzing documents relating to historic fill events continue drafting narrative response to supplemental 104e request, draft index to documents related to LDW superfund, Analyze groundwater lab report, discuss nature and basis for historic site reconfigurations of Glacier property, various correspondence and meetings	LDW Superfund	
1107109	2/17/2011	Ater Wynne	Reichhold	1/3/2011–1/31/2011	\$58,639.19	drafting index to documents for Lower Duwamish Waterway Superfund in preparation for response to FOIA request from EPA, review and comment on first draft 104e response, analyze deposition transcripts, various correspondence and meetings, file research, Review mediation documents from LS Reichhold, legal research,	LDW Superfund	\$58,639.19
1107689	3/21/2011	Ater Wynne	Reichhold	2/1/2011–2/24/2011	\$29,107.27	various correspondence and meetings, Analyze correspondence related to Supplemental 104e Response, analyze information regarding labs, review deposition transcripts,	LDW Superfund	



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1108357	4/14/2011	Ater Wynne	Reichhold	3/4/2011–3/21/2011	\$8,770.00	Research issues related to fish window for in–water work in Duwamish, Analyze and edit draft responseto comments letter, discuss history of cement operations at Glacier property, Analyze groundwater contour map and report, various correspondence and meetings	LDW Superfund	
1109571	6/16/2011	Ater Wynne	Reichhold	5/2/2011–5/20/2011	\$12,012.50	analysis of revised research summary concerning potential for rescission of agreement, analyzing issues related to the operations of prior tenant, Analyze correspondence and documents from Puget Sound Regional Archive, various correspondence and meetings,	LDW Superfund	
1110077	7/11/2011	Ater Wynne	Reichhold	6/1/2011–6/30/2011	\$12,259.00	analyze specific sections of Jorgenson Forge source control evaluation in relation to Mineralized Cell Wood Preserving operations, analyze ERMs preliminary groundwater sampling data, various meetings and correspondence, analyze site history and relevant data reports, review invoices,	LDW Superfund, mineralized cell	
1110833	8/11/2011	Ater Wynne	Reichhold	7/6/2011–7/29/2011	\$10,766.00	Analyze access agreement, analyze correspondence from client, Glacier, ERM and CH2MHill, prepare budget, various meetings and correspondence, Begin analysis of legal arguments concerning the limits of the Settlement Agreement between Lone Star/Glacier and Reichhold	LDW Superfund	
1111263	9/9/2011	Ater Wynne	Reichhold	8/2/2011–8/28/2011	\$10,826.00	Analyze file documents, conduct legal research, discuss scope of sediment sampling and issues with sampling outside of property boundaries, analyze various correspondence front client, Glacier and ERM, various meetings, discuss Ecologys knowledge of historical operations at site	LDW Superfund	
1111917	10/10/2011	Ater Wynne	Reichhold	9/1/2011–9/28/2011	\$12,834.00	discuss completion of EPA CERCLA investigation, prepare draft budget cost, review revised Work Plan and Tables for RIFS, various correspondence and meetongs, analyze various correspondence from client, Glacier, ERM and Ecology	LDW Superfund	
1112522	11/8/2011	Ater Wynne	Reichhold	10/3/2011–10/31/2011	\$10,028.00	Receive analyze and respond to proposed edits to letter to Ecology regarding corrections to record, prepare and deliver revisions to Prolar IDW letter, review of groundwater sampling, various correspondence and meetings, analyze correspondence from client, Glacier, Ecology and ERM	LDW Superfund	
1113303	12/9/2011	Ater Wynne	Reichhold	11/2/2011–11/30/2011	\$30,141.19	Analyze FOIA and Washington public records, review documents produced in 104e request, Complete review of ERM documents, review Lone Star protective order, various correspondence and meetings	LDW Superfund	
1113785	1/10/2012	Ater Wynne	Reichhold	12/7/2011–12/28/2011	\$11,086.56	Review draft proposed sampling and analysis proposal from ERM, review of proposed modification to work plan, various correspondence and meetings	LDW Superfund	



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1114681	2/15/2012	Ater Wynne	Reichhold	1/3/2012–1/30/2012	\$17,436.43	Receive analyze evaluate and edit updates to CBI letter and finlize draft declaration, Review chemistry background issues, review of groundwater analytical results, Research FOIA responses, various correspondence and meetings	LDW Superfund	
1115256	3/16/2012	Ater Wynne	Reichhold	2/1/2012–2/29/2012	\$22,883.75	Research involuntary acquisition exemption and lessor liability under the MTCA and CERCLA, legal research, Review soil and groundwater analytical results, Analyze file site maps, correspondence with client, ERM. Ecology various meetings	LDW Superfund	
1115801	4/6/2012	Ater Wynne	Reichhold	3/1/2012–3/29/2012	\$15,042.09	Review draft monthly progress report and analytical results, Research potential liabillty of local government lessor that acquires property involuntarily, legal research, Revlew draft proposed memo and attachments for groundwater sampling and analysis memorandum, various correspondence and meetings	LDW Superfund	
1116747	5/6/2012	Ater Wynne	Reichhold	4/4/2012–4/27/2012	\$19,734.88	review AO timeline for dispute resolution, review possible interim remedial action approaches for pentachlorophenol at LDW site, discuss litigation and dispute resolution options for site, review of MTCA regulations, various meetings and correspondence analysis, legal research	LDW Superfund	
1117283	6/13/2012	Ater Wynne	Reichhold	5/1/2012–5/31/2012	\$21,543.00	review correspondence from DOE, ERM, client, Glacier and Ecology, various correspondence and meetings, review 104e responses , WDFW approval of in water work and review of sampling process, Review final revised draft responses to Ecology and work plan text and figures, Review revised sediment access agreement	LDW Superfund	
1117840	7/10/2012	Ater Wynne	Reichhold	6/6/2012–6/28/2012	\$10,706.00	Review and respond to various correspondence with Glacier, ERM, Ecology and others, various meetings, review groundwater sampling results and sediment sampling project, review reasearch on King County lease and associated liability, legal research,	LDW Superfund	
1118670	7/14/2012	Ater Wynne	Reichhold	7/2/2012–7/31/2012	\$28,937.72	review of EPA proposed cleanup for Lockheed site, Receive analyze and evaluate memoranda and research discussing Mineralized Cell Wood Preserving Company and liability issues related to King Countys ownership, legal research (CERCLA, Toxics Control Act), prepare memorandum reagrding King Countys liability, various correspondence and meetings	LDW Superfund	



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1119192	9/11/2012	Ater Wynne	Reichhold	8/1/12–8/31/2012	\$17,591.37	legal research, Review draft objection letter to DOE, Investigation into Mineralized Cells wood preserving operation in 1930s, Analyze Settlement Agreement between Reichhold Chemicals and Lone Star Northwest, various correspondence and meetings, Review progress report to DOE	LDW Superfund	
1120029	10/11/2012	Ater Wynne	Reichhold	9/4/2012–9/28/2012	\$30,585.06	Review of final work plan, various correspondence and meetings, Analyze and evaluate Agreed Order Ecology regulations regarding dispute resolution and judicial review issues, legal research, various correspondence and meetings,	LDW Superfund	
1120573	11/6/2012	Ater Wynne	Reichhold	9/6/2012–10/31/2012	\$24,913.25	Review correspondence from ERM and others, various meetings and correspondence, legal research, Analyze dispute resolution documents, Review CERCLA section 104e response , Review draft Spring 2012 groundwater sampling results, analysis of settlement agreement	LDW Superfund	
1121277	12/4/2012	Ater Wynne	Reichhold	11/1/2012–11/30/2012	\$17,174.57	strategy for preparing appeal of Ecology decision on dispute resolution review Agreed Order and MTCA research, legal research, review 2008 remedial action report to Ecology for preparation of edits to appeal notice review sediment discussion in Companies Work Plan and Ecology Work Plan, review of final Feasibility Study prepared by PLP group for sediment investigation at LDW , various correspondence and meetings	LDW Superfund	
1122353	1/14/2013	Ater Wynne	Reichhold	12/3/2012–12/28/2012	\$15,272.82	review photo evidence of 5900 West Marginal Way SW site from ERM, various correspondence and meetings, Analyze materials subject to chain of custody procedures	LDW Superfund	
1122806	2/11/2013	Ater Wynne	Reichhold	1/2/2013–1/30/2013	\$18,683.06	report on findings of photo evidence review, results of FOIA research on USACE and responses to 104e requests from EPA , Review and modify Agreed Order extension request, Review draft monthly progress report, review correspondence from client, ERM, CH2M Hill, and others, various meetings	LDW Superfund	
1123667	3/13/2013	Ater Wynne	Reichhold	2/1/2013–2/28/2013	\$21,497.50	Review draft technical issues documents for technical work out of disputed Work Plan, revise extension letter, review of USACE documents obtained from response to 104e request by EPA , review Spring 2012 groundwater memorandum and revised list of technical objections from ERM, monthly progress report, various correspondence and meetings, Review sediment report and data compiled by ERM,	LDW Superfund	
1134469	4/11/2013	Ater Wynne	Reichhold	3/1/2013–3/29/2013	\$35,232.73	present Mineralized Cell evidence to Ecology, Complete review of MICA remedial investigation, Review revised draft presentation from ERM for Ecology meeting, site tax research, revise FOIA request , various correspondence and meetings	LDW Superfund, mineralized cell	



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1125355	5/13/2013	Ater Wynne	Reichhold	4/1/2013–4/29/2013	\$38,317.50	Research testimony highlighted by Ecology regarding the disposal of alleged chemicals into concrete lined tank and earthen tank analyze counsel for Lone Star Northwests mediation memo and reliance on the deposition of Reichhold employee, review testimony, review potential impacts to Reichhold from EPA proposed plan to cleanup waterway, review MTCA process, Review and markup draft Monthly Progress Report, legal research, various correspondence and meetings	LDW Superfund	
1126351	6/14/2013	Ater Wynne	Reichhold	5/2/2013–5/31/2013	\$26,452.95	Research 1995 Settlement Agreement between Lone Star and client, Review LDWG draft comments to EPA plan, prepare presentation, Prepare and deliver revised FOIA request to USACE , various correspondence and meetings	LDW Superfund	
1127260	7/18/2013	Ater Wynne	Reichhold	6/2/2013–6/28/2013	\$26,934.07	Review Ecology proposal for revised Work Plan, legal research, review data gaps and work plan documents, Review revised Monthly Report to Ecology with stormwater data, review comments on proposed scope for Ecology work plan, analyze transmittal letter from LDWG to EPA , various correspondence and meetings	LDW Superfund	
1128105	8/19/2013	Ater Wynne	Reichhold	7/1/13–7/31/13	\$20,595.00	Review data report from Seattle Public Utilities, review FOIA response , review presentation materials, correspondence with ERM, client, Glacier and others, various meetings, review and markup of draft addendum to RI WP	LDW Superfund	
1128623	9/15/2013	Ater Wynne	Reichhold	8/1/13–8/30/13	\$19,510.70	review of revisions to technical memo from client and CH2M Hill and prepare comments and redline edits, review FOIA correspondence and documents from USACE , various correspondence and meetings, Review status of dioxin research on FTP site	LDW Superfund	
1129126	10/4/2013	Ater Wynne	Reichhold	9/4/13–9/30/13	\$21,753.50	Review and markup Ecology Work Plan addendum, Research status of the FOIA request, Review and respond to correspondence from ERM, Correspondence with client and CH2M Hill regarding review of dioxin documents, legal research, various meetings	LDW Superfund	
1130227	11/14/2013	Ater Wynne	Reichhold	10/1/2013–10/31/2013	\$23,017.82	Review and respond to correspondence from ERM, review of Port 115 RIFS Work Plan, legal research, various correspondence and meetings	LDW Superfund	
1130228	11/14/2013	Ater Wynne	Reichhold	10/24/2013–10/29/2013	\$6,867.00	Billed to 054611–0014 LDW Superfund Site	LDW Superfund	\$6,867.00



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1130673	11/10/2013	Ater Wynne	Reichhold	11/1/2013–11/25/13	\$19,705.59	Analyze FOIA documents, Review correspondence from ERM and others, Analyze Washington Model Toxics Control Act; Billed to 054611–011 AO	LDW Superfund	
1136074	11/10/2013	Ater Wynne	Reichhold	11/20/2013–11/25/2013	\$4,607.00	Billed to 054611–0014 LDW Superfund Site	LDW Superfund	\$4,607.00
1131880		Ater Wynne	Reichhold		\$13,009.53	Billed to 054611–011 AO	LDW Superfund	
1131941		Ater Wynne	Reichhold		\$4,558.50	Billed to 054611–0014 LDW Superfund Site	LDW Superfund	\$4,558.50
1132266		Ater Wynne	Reichhold		\$29,127.87	Billed to 054611–011 AO	LDW Superfund	
1132267		Ater Wynne	Reichhold		\$1,119.00	Billed to 054611–0014 LDW Superfund Site	LDW Superfund	\$1,119.00
1132919		Ater Wynne	Reichhold		\$14,180.50	Billed to 054611–011 AO	LDW Superfund	
1132920		Ater Wynne	Reichhold		\$1,158.00	Billed to 054611–0014 LDW Superfund Site	LDW Superfund	\$1,158.00
1133715		Ater Wynne	Reichhold		\$20,261.00	Billed to 054611–011 AO	LDW Superfund	
1133716		Ater Wynne	Reichhold		\$2,449.00	Billed to 054611–0014 LDW Superfund Site	LDW Superfund	\$2,449.00
1134483		Ater Wynne	Reichhold		\$15,243.50	Billed to 054611–011 AO	LDW Superfund	
1134484		Ater Wynne	Reichhold		\$8,729.50	Billed to 054611–0014 LDW Superfund Site	LDW Superfund	\$8,729.50
1135319		Ater Wynne	Reichhold		\$12,599.00	Billed to 054611–011 AO	LDW Superfund	
1135320		Ater Wynne	Reichhold		\$21,283.50	Billed to 054611–0014 LDW Superfund Site	LDW Superfund	\$21,283.50
1135995		Ater Wynne	Reichhold		\$4,542.50	Billed to 054611–011 AO	LDW Superfund	
1135996		Ater Wynne	Reichhold		\$51,104.65	Billed to 054611–0014 LDW Superfund Site	LDW Superfund	\$51,104.65
1136791		Ater Wynne	Reichhold		\$9,235.11	Billed to 054611–011 AO	LDW Superfund	
1136792	8/13/2014	Ater Wynne	Reichhold	7/7/2014–7/30/2014	\$23,400.21	Billed to 054611–0014 LDW Superfund Site	LDW Superfund	\$23,400.21
1137592	9/15/2014	Ater Wynne	Reichhold	7/31/2014–8/29/2014	\$8,415.50	Billed to 054611–011 AO	LDW Superfund	
1136793	9/14/2014	Ater Wynne	Reichhold	7/31/2014–8/29/2014	\$21,645.00	Billed to 054611–0014 LDW Superfund Site	LDW Superfund	\$21,645.00
1137983	10/3/2014	Ater Wynne	Reichhold	9/3/2014–9/30/2014	\$15,800.50	Billed to 054611–011 AO	LDW Superfund	
1137984	10/3/2014	Ater Wynne	Reichhold	9/2/2014–9/17/2014	\$33,232.00	Billed to 054611–0014 LDW Superfund Site	LDW Superfund	\$33,232.00
81 invoices					\$1,266,828.21 \$976,060.16			\$290,768.05

Appendix C

Qualifications of Expert



Expertise

- Contaminated sediment investigation and remediation
- Environmental chemistry forensic analysis
- Technical support for allocation, litigation, and construction claims
- Source identification and control
- Environmental effects of dredging and capping
- Manufactured gas works investigation and remediation
- Confined disposal facility siting and design
- Design coordination and management
- Community outreach and communication
- Waterfront property redevelopment

Summary

Mr. Spadaro is a leading expert in urban and industrial waterfront redevelopment, sediment cleanup, and environmental effects of dredging. Technically based in environmental chemistry with strong proficiency in hydrogeology, geology, regulatory affairs, and remediation technology, Mr. Spadaro has over 36 years of experience applying his expertise and management skills to projects where sediment quality is a prominent issue. As a senior technical advisor, Mr. Spadaro provides technical support for investigation, cleanup, monitoring, litigation, allocation, construction claims, cost-recovery actions and other matters related to sediment remediation. In addition, Mr. Spadaro has extensive expertise in the siting, design, permitting, and construction of confined disposal facilities and in the fate and transport of contaminants in estuarine, riverine, and marine aquatic environments. He is an expert advisor to clients for international sediment management and remediation projects in Europe, the Middle East, and Asia.

Through years of work focused entirely on the remediation of contaminated sediment and land on the urban and industrial waterfront, Mr. Spadaro has developed expertise in application of the available technologies including dredging, capping, monitored natural attenuation, and source control. The successful execution of these highly complex sediment remediation projects demands meticulous planning, strong, scientifically sound technical approaches, and credibility with regulatory authorities. Mr. Spadaro's international reputation for designing and implementing inventive, appropriate, and cost-effective waterfront solutions is anchored in these qualities and in his commitment to seek out and respect the unique needs of every project, client, and cultural setting.

Professional Experience**Determination of Natural Resource Damages and Evaluation of Possible Restoration (2020)**
Confidential Client, Klaipeda, Lithuania

Mr. Spadaro is the commercial representative and client liaison for an investigation of possible natural resource damages due to wastewater discharge from an industrial facility. The discharge contributed increased concentrations of nutrients to the Curonian Lagoon. The evaluation included comparison of ten years of chemistry data for the facility treatment facility and the lagoon as well as evaluation of the treatment plant capabilities.

Technical Consultant for Environmental Liability Assessment and Cost Allocation (2019–Ongoing)

Confidential Shipyard Site, Whatcom County, Washington

Mr. Spadaro is the project director and expert witness for a case involving technical expert support for environmental liability assessment and cost allocation for the remediation of contamination at a shipyard site under an Agreed Order with Washington State Department of Ecology (Ecology). TIG Environmental's client is corporate successor to a former owner and operator of a facility on the site. TIG Environmental is producing technical evaluations of historical and current operations on the site and developing forensic and statistical analyses to identify contaminants attributable to the different types of operations at the site. Based on the results of these technical evaluations and analyses, TIG Environmental is developing an allocation strategy and methodology to estimate potential allocable shares to each owner and operator associated with the Site. TIG Environmental is assisting client's counsel with developing early cash-out settlement strategies to negotiate with the party performing the remediation.

Forensic Analysis for Environmental Liability Assessment (2019–2020)

Confidential Client, Confidential Location

TIG Environmental is providing its expert technical consulting related to determining the origin of polychlorinated biphenyls (PCBs) detected in PCBs in cow's milk. TIG Environmental is performing a forensic evaluation to identify potential sources of PCBs in surrounding areas and the pathways for those discharges to expose the local cows to PCBs (soil, sediment, feed, grazing, drinking water, architectural coatings). To support this effort, TIG Environmental suggested sampling efforts and expert evaluation of the resulting data. In addition, TIG Environmental is developing graphics to visualize the data and memoranda to summarize the results of the forensic evaluation. Mr. Spadaro is the project director and client liaison for the case.

Expert Consultation for Sediment Remediation Projects in Flanders (2016–2020)

Flemish Government and AnteaGroup, Antwerp, Belgium

In Flanders, the management of contaminated upland sites and the management of water are the responsibility of two separate governmental authorities. Sediments are a shared responsibility. The Public Waste Agency of Flanders (OVAM) is responsible for upland cleanup and soil. Sediments fall under the Soil Decree. The Flanders Environment Agency (VMM) is responsible for water management. Sediments are considered part of the aquatic system. Historically, each agency has adopted a different approach to sediment pollution. Increasing demand for use of the historically industrialized waterfront throughout Flanders was looking for a more coordinated approach in which investigation of contaminated upland sites would involve a collateral evaluation of the likelihood of potential sediment contamination. The Flemish Government requested assistance in harmonizing the regulations and addressing several specific sites in Ghent and Antwerp.

South Park Marina Remedial Action (2017–Ongoing)

South Park Marina Limited Partnership, Seattle, Washington

Mr. Spadaro is the project director for a team of scientists and engineers assisting the owner of a recreational marina site in the South Park neighborhood of Seattle, Washington. This site is the subject

of remedial action under a Washington State Department of Ecology (Ecology) Administered Agreed Order. Soil and groundwater at the site are contaminated with polychlorinated biphenyls (PCBs), petroleum hydrocarbons, volatile organic compounds, pesticides, and metals requiring cleanup under the Washington State Model Toxics Control Act (MTCA). TIG Environmental's work includes investigating of historical sources of contamination both on-site and nearby off-site. As a result, TIG Environmental identified and nominated additional potentially liable persons (PLPs) for release(s) of hazardous materials affecting the site to Ecology. These PLPs are now involved as participants under the Agreed Order. TIG Environmental, on behalf of South Park Marina Limited Partnership, and the other PLPs are working in partnership to oversee the completion of the tasks required to be performed under the Agreed Order, including a remedial investigation (RI) work plan, RI field activities, a source control evaluation, and a RI Report. TIG Environmental completed several source control, RI, feasibility study (FS), and preliminary engineering design tasks supportive of efforts under the current Agreed Order and/or future formal program designations.

Evaluation of Underwater Sound from Dredging Vessels (2015)

Confidential Client, Confidential location

As a result of the growing interest in the possible impacts of underwater sound, a major dredging company commissioned a study of the sound produced by their vessels. The study included measurements of underwater sound produced by a hydraulic cutter suction dredge, a backhoe excavator dredge, and a rock drilling vessel. Operation-dependent and distance-dependent measurements were made and cataloged for future reference.

Technical Support of Cost Allocation (2014–Ongoing)

Confidential Client, Seattle, Washington

TIG Environmental provides expert technical support to a private property owner participating in a Superfund site allocation. The Superfund sediment site consists of five miles of an urban and industrial estuarine waterway. Working with the property owner's attorney, TIG Environmental evaluated potential sources of polychlorinated biphenyl (PCB) contamination in sediments adjacent to the property and developed an allocation strategy based on forensic chemistry and sediment transport modeling.

Mr. Spadaro is currently providing expert analysis, advice, reporting, and testimony related to the site. He also supervises a large team of scientists and engineers developing the technical work needed to support the client's position in the case.

Design for Sediment Removal, Capping, and Natural Attenuation (2015–Ongoing)

Yosemite Slough Cooperating Parties Group, San Francisco, California

TIG Environmental and a design team with engineers and scientists from multiple specialist firms are conducting pre-remedial design studies for a contaminated intertidal channel in a highly urbanized area within San Francisco Bay. EPA had originally proposed a time-critical removal action for removing more than 20,000 cubic yards of contaminated sediment, however TIG Environmental helped its client achieve agreement with EPA on the application of risk-based multi-technology approach, which will result in significant reduction in removal volume and cost.

Pre-remedial design studies include specialized evaluations of sedimentation rates, depth of the biologically active zone, bulk sediment and pore water chemistry, erosion and particle transport, and geotechnical parameters. Overall, the studies will support the design for dredging, capping, and monitored natural recovery of the contaminated sediments.

Mr. Spadaro is the director of the design team of engineers and scientists from multiple specialist firms. The design will include multiple proof-of-concept studies and the development of plans and specifications for construction.

Technical Consultation and Allocation/Litigation Support (2012–Ongoing)

Confidential Client, Seattle, Washington

TIG Environmental provides litigation support to a Washington State agency participating in a Superfund site allocation. The Superfund sediment site consists of five miles of urban and industrial estuarine waterway. The key issues revolve around potential stormwater loads from state-maintained roads, bridges, and properties. TIG Environmental prepared expert reports that evaluate whether there is a potential relationship between the Superfund site sediment contamination and the discharge of hazardous substances from the state-owned facilities, potentially resulting in the need for remedial action and associated response costs. TIG Environmental is developing an allocation strategy based on sampling and statistical analysis of stormwater, historical and scientific research, drainage pathway delineation, and sediment transport modeling. TIG Environmental also assists the state agency with the development of source control plans in accordance with Ecology's source control strategy.

Mr. Spadaro is currently providing expert analysis, advice, reporting, and testimony related to the site. He also supervises a large team of scientists and engineers developing the technical work needed to support the client's position in the case.

Expert Consultation for Sediment and Uplands Cleanup Cost Allocation (2015–Ongoing)

Confidential Client, Bellingham, Washington

TIG Environmental provides technical support to a former operator of a rock crushing facility that operated on uplands adjacent to an industrial waterway in Bellingham, Washington. The 51-acre site has been occupied by numerous industrial operations, including saw and lumber mills, fish processing, municipal landfilling, bulk fuel storage, coal storage and shipping, and boat maintenance. Sediments within the waterway and soil and groundwater within the uplands require cleanup under MTCA. The waterway and uplands are administered as separate cleanup sites by Ecology under Agreed Orders. Environmental testing confirmed elevated concentrations of mercury, nickel, phthalates, polycyclic aromatic hydrocarbons (PAHs), and dioxin/furans in sediment, and lead, arsenic, mercury, nickel, PAHs, and petroleum hydrocarbons in uplands soil. The client's former rock crushing operation is identified as the source of nickel. Improper screening levels for nickel were selected and interpreted as enforceable cleanup levels by Ecology during the remedial investigation and feasibility study (RI/FS) phase of both sites. TIG Environmental conducted several technical analyses to evaluate the role of nickel as a contaminant requiring cleanup in sediments and soil. As a result of TIG Environmental's work, Ecology recognized the improperly selected screening levels and requested that the performing party modify the nickel cleanup levels. Less stringent cleanup levels were developed for use during the

cleanup action and used as the basis for allocating a lower percentage share of cleanup costs to the client.

Mr. Spadaro is providing technical support for the case regarding the sources of the subject contaminants, particularly nickel, and the lack of a causal effect in site bioassay tests.

Remedial Design and construction, Deep excavation of PCB-contaminated Sediments (2014)

Jorgensen Forge Corporation and Boeing Airplane Company, Seattle, Washington

As part of the Record of Decision (ROD) at Lower Duwamish Waterway Superfund site, numerous Early Actions were proposed for implementation prior to the development of a larger, more comprehensive remedy. Groundwater, soil, and sediment issues were identified at the Jorgensen Forge industrial facility. TIG Environmental was hired to assist Jorgensen Forge in the design and implementation of a deep excavation to remove high concentrations of PCB contaminated sediments along the riverbank. TIG Environmental strategized, designed, and implemented a removal action, which included an internally braced sheetpile enclosure needed to excavate the deeply buried sediments and yet maintain stability of nearby slopes and structures. The work was accomplished under EPA oversight in a short time period. TIG Environmental played a critical role in negotiating with the agencies, procuring materials, and pre-qualifying construction contractors as well as monitoring the construction on behalf of the owner. Mr. Spadaro was project director for the design and construction.

Expert Review of Remediation of Wood Waste in Sediment (2013)

Confidential Client/Location

Wood waste is an important issue at many sites. Aside from the potential for related chemical contamination, the physical effects on benthic community structure can be significant. Remediation is not straight forward since these sediments are difficult to dredge or cap due to their very low strength and high water content. This work entailed compiling approaches taken at various sites around the world and assessing capping and dredging at a site in a fjord setting.

Expert Review of Deep Water Dredging and Capping Technologies (2013)

Confidential Client/Location

Mr. Spadaro assisted a team of experts in review of currently available and possible future technologies for dredging and capping in approximately 200 meters of water as part of the considerations surrounding the long-term management and eventual decommissioning of offshore oil production assets.

Technical Consultation and Litigation Support (2013–2019)

Confidential Client, California

TIG Environmental and a co-consultant provided technical support for investigative identification of PRPs associated with an intertidal channel with contaminated sediments. Historical research consisted of identification and review of property records and aerial photographs, and several other PRPs were identified and successfully brought into the case. In addition, TIG Environmental used multiple lines of technical evidence and analysis to underpin a successfully applied cost allocation concept.

Mr. Spadaro served as senior technical advisor in negotiations with EPA to improve removal action design and address community concerns regarding quality of life issues. He also provided technical support for allocation of cleanup costs to multiple parties.

Technical Consultation and Allocation/Litigation Support (2012–Ongoing)

Confidential Client, Multnomah County, Oregon

TIG Environmental provides technical expert support for environmental liability assessment and cost allocation for the remediation of sediments in the Portland Harbor Superfund Site, and for the associated Natural Resource Damages claims. The harbor has been the site of numerous industrial and manufacturing operations for more than a century, including shipbuilding, petroleum storage and distribution, metal salvaging, and electrical power generation. Technical support for this project includes research, sampling, and forensic analysis to determine the specific contaminants associated with activities or facilities. The project also includes evaluating potential historical contaminant sources, determining contaminant fate and transport, and chemical fingerprinting PAHs and PCBs.

Mr. Spadaro is currently providing expert analysis, advice, reporting, and testimony related to the site. He also supervises a large team of scientists and engineers developing the technical work needed to support the client's position in the case.

Rehabilitation of Evaporation Ponds (2012)

Haifa Chemicals Corporation, LTD, Haifa, Israel

Mr. Spadaro served as part of an expert team to evaluate alternatives for rehabilitation of four evaporation ponds associated with fertilizer manufacturing in the Negev Desert in southern Israel. The work involved on-site assessment of conditions, including specialized odor assessment followed by development of rehabilitation alternatives. The selected alternative included dredging of two ponds and capping of a third with the dredged material. Interactions with the Ministry of Environment were crucial in securing permission to accomplish the work.

Removal Action Studies, Design, and Construction Management, Passaic River Superfund Site (2008–2012)

Confidential Client, Passaic River, Newark, New Jersey

The Passaic River is one of the most highly contaminated urban and industrial waterways in the world. Mr. Spadaro has maintained a long-term strategic consulting role with one of the involved parties. He provided technical advice on and oversight of numerous technical studies and conceptual design efforts leading ultimately to a plan for sediment removal and off-site disposal. Work included evaluation of stormwater and combined sewer overflow inputs, review of EPA and consultant work products, and preparation of design documents for Phase I and Phase II non-time-critical removal actions of 200,000 cubic yards of highly contaminated sediment. Mr. Spadaro served as technical advisor for a multi-disciplinary team performing studies of sediment quality, dredging, sediment processing, transport and disposal, water quality, hydrodynamics, community health and safety, and confined disposal facility siting and design. He provided review and quality assurance for extensive design deliverable development as well as support and troubleshooting during the construction phase.

Strategic Consultation and Technical Support for Litigation, Passaic River Superfund Site (2008–2012)

Confidential Client, Passaic River, Newark, New Jersey

Multiple sources of contamination have contaminated the Passaic River, which passes through one of the most heavily industrialized regions in the world, over a period of approximately 200 years. Mr. Spadaro assisted one of the responsible parties in sediment characterization, source identification and sediment geochronology. Work included development of sampling designs for surface water, sediments, sewers and storm drains. In close coordination with the client's legal counsel, Mr. Spadaro developed white papers and technical reports to catalog sources and provide advice for allocation and cost recovery actions.

Waterfront Facility Redevelopment Plan (2011–2012)

Southern Wood Piedmont Corporation, Wilmington, North Carolina

Southern Wood Piedmont, the former owner of a wood treatment facility on the Cape Fear River, hired Mr. Spadaro to assist them, their attorneys, and the North Carolina Port Authority (the current site owner) in the development of a comprehensive plan for reuse of the property. The work was performed based on remedial action plans developed by others and included evaluation of container, liquid bulk, and solid bulk facilities.

Xiawangang Canal Remedial Action Conceptual Design (2011–2012)

OTEK Pty. Ltd. Of Australia and the Zhuzhou Municipal Economic Authority Zhuzhou City, Hunan Province, China

The redevelopment and public safety plans of the city included removal of heavy contaminated sediments from a 4-kilometer canal in an industrial zone. The work, which was conducted on a highly accelerated schedule, included site reconnaissance and preparation of a basis of design report and conceptual design for removal and treatment of 30,000 cubic meters of sediment. Mr. Spadaro supervised a team of engineers and scientists, working around the clock and in two languages, to produce the needed documentation for final designers and contractors locally.

Department of Sediment Investigation and Remediation Guidance Documents (2011)

Energy Institute, United Kingdom

The Energy Institute (a consortium of energy companies) retained Mr. Spadaro and others to develop guidance on the rapidly developing regulatory climate related to contaminated sediments in the European Union and the United Kingdom. Using existing knowledge, focused research, and interviews, the guidance was developed at a practical, working level for technical personnel within the member companies.

Expert Report on Remediation and Cost Effectiveness (2010–2011)

DLA Piper and BAE Systems, Inc., San Diego, California

The BAE Systems shipyard in San Diego, California was facing litigation related to proposed sediment remediation. Their attorneys retained Mr. Spadaro and other experts to prepare an expert report that evaluates the cost effectiveness of the proposed remedy relative to more extensive, but not necessarily

more effective, proposals. The expert work included toxicological and economic evaluations (performed by others) as well as an overall synthesis that was presented to hearing examiners for the California Water Quality Control Board. The examiners found the work definitive and adopted the original remediation plan.

Control of NAPL Seeps, Pine Street Canal Superfund Site (2006–2011)

Green Mountain Power, Burlington, Vermont

An existing sand cap that was designed by others to physically isolate chemical contaminants from the overlying water failed, and nonaqueous-phase liquid (NAPL) was seeping through the cap and entering the water column. Mr. Spadaro was retained to evaluate NAPL controls to eliminate seepage into the canal and was readily and economically implemented as partial replacement for the existing sand cap. Serving as principal-in-charge for this evaluation, design, and construction effort, with responsibility for ensuring that activities were consistent with project goals and that technical work products met quality assurance standards. The work included field studies, bench and pilot tests, and, ultimately, design of a light-weight reactive core mattress cap using organoclay to sorb NAPL leaking through the original sand cap. The new cap was successfully installed in 2010 and 2011.

Emergency Removal of Contaminated Sediments (2010)

Confidential Client, Wiesbaden, Germany

An accidental release of a dense non-aqueous phase liquid heat transfer fluid required the removal of free product and contaminated sediments from the River Rhine. The work included expedited site testing and field design with contractor assistance for removal and processing of the sediments as well as treatment of dewatered fluids. Mr. Spadaro served as senior advisor for an international team of scientists, engineers, and contractors. The free product and involved sediments were effectively removed and deposited at an offsite disposal facility. Processing included in-barge dewatering with geotubes. Complicating factors included the presence of unexploded ordinance in the sediments and sensitive nearby structures.

Design of Engineered Containment Facility for Contaminated Sediments (2004–2011)

Hamilton Port Authority, Hamilton, Ontario

The Hamilton Port Authority, Environment Canada, and the Ontario Ministry of the Environment began constructing an engineered containment facility in the Randle Reef area of Hamilton Harbour, where sediments are contaminated as the result of a coal-tar spill in the 1980s. Mr. Spadaro served as the environmental studies task manager and overall technical advisor for this multidisciplinary project. Critical factors for design included contaminant transport and fate, short-term and long-term water quality, and effluent treatment. The basis of design report and final design are complete and have been accepted by the multi-agency consortium sponsoring the project.

Development of Conceptual Dredged Material Management Plan (2011)

Louisiana Office of Coastal Protection and Research, Baton Rouge, Louisiana

The office of Coastal Protection has the responsibility for rehabilitating salt marshes along the coast of Louisiana. Mr. Spadaro reviewed existing dredging and restoration activities with respect to cost and

technology. Using historical data and interviews with dredging contractors, he provided a comprehensive evaluation of past practices and recommendations for future dredging and restoration.

Peer Review of Proposed Remediation Plans (2009–2010)

Haifa Chemicals Corporation, LTD, Haifa, Israel

The Kishon River Authority proposed a removal action based on historical effluent discharges. Mr. Spadaro reviewed existing information and proposed alternative remediation plans. He also prepared a critical review of site characterization and remedial action plans. Additional work included providing strategic advice on sediment remediation plans and cost allocation.

Sediment and Water Quality Data Review (2011)

Confidential Client and Offshore Location, Southeast Asia

Mr. Spadaro was asked to review 10 years of sediment and water quality data related to offshore oil and gas production to evaluate possible environmental impacts of production activity. He provided recommendations for program improvement and additional field studies.

Review of Corporate Contaminated Sediment Issues (2008)

Akzo Nobel, Arnhem, the Netherlands

Mr. Spadaro provided training to high level corporate environmental staff in a two-day workshop dealing exclusively with contaminated sediment management. He reviewed contaminated sediment management policies and practices at numerous sites and provided suggestions for technical studies and negotiation strategies to improve outcomes.

Peer Review of Confined Disposal Facility Design and Management (2009)

U.S. Army Corps of Engineers, New Orleans, Louisiana

As part of restoration efforts following damage caused by Hurricane Katrina, Mr. Spadaro was retained by the U.S. Army Corps of Engineers (USACE) to evaluate the disposal of contaminated dredge material from the Industrial Harbor Navigation Canal in a nearby confined disposal facility (CDF). He served as overall technical advisor to the project team conducting peer review of CDF design, community safety, and long-term maintenance and monitoring. He also assisted USACE in addressing community concerns about short- and long-term risks of CDF operation as well as the potential for catastrophic failure.

Evaluation of CDF Feasibility (2009–2010)

Retia (Arkema), Portland, Oregon

Mr. Spadaro served as technical advisor to multi-disciplinary team performing engineering evaluation of the feasibility of a CDF for dichlorodiphenyltrichloroethane- (DDT-)contaminated sediments. Work included negotiation with EPA and conceptual design of sediment removal and a unique cellular cofferdam wall confined disposal facility.

Sediment Removal Action Evaluation and Design (2007–2009)

3M Corporation, East Cove, Cottage Grove, Minnesota

Mr. Spadaro provided strategic advice for negotiation of removal action with Minnesota Pollution Control Agency. He evaluated conceptual removal action design and provided technical oversight for a proposed design-build approach to remove sediments contaminated with fluorinated compounds in a cove adjacent to the Mississippi River.

Sediment Removal Action (2008)

3M Corporation, Sayreville, New Jersey

Mr. Spadaro assisted the client with review of proposed removal action at Horseshoe Road Superfund Site on Raritan River. He evaluated capping, removal, and natural recovery.

Evaluation of Proposed Removal Action (2008)

Ford Motor Company, River Raisin, Michigan

Mr. Spadaro evaluated the EPA-proposed removal action for contaminated sediments in this highly industrialized river drainage. He advised the client on removal action costs and benefits and evaluated the potential for additional PRP involvement. Mr. Spadaro performed limited sampling to refine agency proposed removal action design.

Contaminated Sediment Management and Remedial Design (2005–2009)

Sediment Investigation and Remediation Strategic Consulting,
Rada di Augusta, Priolo Site of National Interest
Confidential Client, Priolo, Sicily, Italy

Mr. Spadaro defined an overall strategy regarding 9,000,000 cubic yards of contaminated sediments in Rada di Augusta, a 25-square-kilometer bay. The initial review of the Italian government's investigation results and cleanup plan revealed extensive enrichment in mercury from a local chloralkali plant and petroleum hydrocarbon contamination. The government's plan called for large-scale dredging and construction of a confined disposal facility. Since performing the initial data review, focused sampling has been conducted to evaluate conditions in the bay. An engineering evaluation was performed to assess remediation alternatives based on a multi-technology approach appropriate to this enormous and complex site.

Contaminated Sediment Management and Remedial Design (2006–2007)

Confidential Client, Navassa, North Carolina

Prior investigation results indicated the presence of lead and other metals in the nearshore sediments adjacent to this former fertilizer plant on the Cape Fear River. Initially asked to review the existing engineering evaluation/cost analysis (EE/CA) as an expert on the remediation of contaminated sediments, Mr. Spadaro conducted pre-design sampling of sediment and wetlands soils needed to support the design of a remedy.

Litigation Support for a Construction Claim (2006–2007)

Confidential PRP Group Client, Tacoma, Washington

Mr. Spadaro led a team that provided expert support regarding the validity of a contractor's claim that its own failure to perform construction on schedule resulted from a purportedly inadequate dredging design. He was responsible for supervising engineers who reviewed the design, plans, and specifications and assisting the client's attorneys in developing their litigation strategy.

Litigation Support, Gashouse Cove Marina (2004–2006)

Pacific Gas and Electric Company (PG&E), San Francisco, California

Gashouse Cove Marina is located at the site of a former manufactured gas plant (MGP) once operated by PG&E. Sediments in the vicinity were contaminated with PAHs from multiple sources, including the MGP. Mr. Spadaro worked with PG&E's legal department to evaluate the City of San Francisco's proposed plan for redevelopment of the marina—the plan calls for dredging, which has the potential to expose contaminated sediments—and the City's claim against PG&E for partial cost of the redevelopment. In addition to litigation support, the team conducted source evaluation and engineering analysis to help ensure that PG&E's level of responsibility was accurately assessed.

Due Diligence Investigation (2006–2007)

Port of Tacoma, Tacoma, Washington

Mr. Spadaro served as a consultant to the Port's environmental, real estate, and legal departments as they worked to evaluate the Port's responsibilities and liabilities should it have decided to purchase a large, contaminated property. The effort involved evaluating extensive environmental documentation from a 1970s-era cleanup, the site's 100-year industrial history, its multi-agency regulatory history, and large-scale soil, groundwater, and sediment contamination with chlorinated solvents and caustics.

Litigation Support for Insurance Cost Recovery (2005)

Nadler Law Group and Confidential Puget Sound Port Authority

Mr. Spadaro was retained to serve as an expert for a complex insurance cost recovery matter involving numerous waterfront properties. The key element of this case involved cost-recovery claims for construction of a confined disposal facility to contain contaminated sediments.

Upland Source Control Investigation and Remediation (2004–2005)

Port of Portland, Portland, Oregon

Mr. Spadaro served as the principal in charge on this 5-year contract to evaluate and clean up multiple Port terminals and other properties along the Willamette River. The work involved review of historical and current site information and ongoing investigation consistent with agreements between the Port and the Oregon Department of Environmental Quality.

EE/CA for Non-Time-Critical Removal Action (2003–2005)

Port of Portland, Portland, Oregon

Mr. Spadaro served as the project manager for a 3-year contract to provide technical assistance for the removal of contaminated sediments adjacent to Terminal 4 of the Port. Mr. Spadaro's responsibilities

included managing characterization of contaminated Willamette River sediments, preparing an engineering evaluation/cost analysis (EE/CA) in accordance with the Administrative Order by Consent between the Port and EPA Region 10, and preparing associated work plans and technical reports. He coordinated with the Port to integrate data and decision making for Terminal 4 with work at the larger Portland Harbor Superfund Site and incorporated developing upland source control strategies now under development into removal alternatives for Terminal 4. The EE/CA was reviewed by the EPA and accepted without comment.

Elliott Bay Water Quality Monitoring and Sediment Sampling (2003–2004)

US Army Corps of Engineers, Seattle, Washington

The Pacific Sound Resources Superfund Site, located on Elliott Bay, has long been a source of hazardous substances associated with former wood-treating operations. Cleanup actions included removing about 700 treated wood pilings, dredging 10,000 cubic yards of contaminated nearshore sediments, and placing a clean sediment cap over about 58 acres of contaminated sediments. Mr. Spadaro supported the construction effort by monitoring water quality during dredging and cap placement and by conducting verification sampling to confirm the integrity and thickness of the engineered cap. He served as the officer in charge for several work elements, including writing the sampling, monitoring, and quality assurance plans, mobilizing in the field to collect water quality and vibracore sediment samples, and coordinating laboratory analysis and data validation. Prior to cap placement, Mr. Spadaro also coordinated physical and chemical testing of the import material to ensure it was suitable for use.

Sediment Sampling Program at Marine Transfer Stations (2003–2004)

New York City Department of Sanitation, New York Harbor, New York

Working on behalf of the prime contractor, Mr. Spadaro executed an initial sediment sampling program related to the conversion of eight former marine transfer stations operated in New York Harbor by the New York City Department of Sanitation. Conversion of the solid waste facilities involved demolishing several structures, removing old piles, repairing bulkheads, and dredging to increase navigational depths. Mr. Spadaro served as technical specialist for the sediment sampling program. This was designed to provide preliminary sediment and water quality data to aid in determining the engineering controls needed to limit contaminant releases to surface water during construction, and identify handling, transportation, and disposal options for the dredged sediment.

Litigation Support for Insurance Cost Recovery (2002)

Short, Cressman, and Burgess and Confidential Puget Sound Port Authority, Washington

Mr. Spadaro was retained as an expert to review extensive documentation and current site conditions at multiple facilities owned by a mid-sized port authority. The sites included a shipyard, boatyard, landfill, and other types of active and unused facilities. Activities included extensive interaction with the port's attorneys, a review of reports, site visits and interviews, preparation of expert opinions, and depositions. The port prevailed in its complaint and received a settlement in keeping with its expectations.

North Channel Confined Disposal Facility (2001–2002)

Port Authority of Venice, Venice, Italy

The Port of Venice was contemplating construction of a large confined disposal facility for containment of contaminated dredge materials. Mr. Spadaro was retained by the Port as a special consultant to address contaminant mobility issues associated with facility construction.

Sediment Treatment Technology Evaluation (2001)

State of Washington

Mr. Spadaro served as project manager and senior scientist to evaluate several contaminated sediment treatment technologies for their effectiveness, ability to be implemented, and cost under three Washington State Department of Natural Resources-specified scenarios. Two were particular to Bellingham Bay, where a multiagency group is working to establish a model process for selecting disposal sites; the third was more widely applicable to contaminated sediments from throughout Puget Sound. Together, the three scenarios form a natural progression for the development of sediment treatment technology in the region.

Removal Action at the Olympic View Resource Area (2001–2002)

City of Tacoma, Tacoma, Washington

The EPA approved a removal action at the Olympic View Resource Area (OVRA) to address approximately 2.2 acres of contaminated marine sediments within the 12.4-acre OVRA site. Mr. Spadaro helped design the removal action—including the development of design and construction documents, design methods, assumptions, and evaluations—and documented quality assurance methods in a construction quality assurance plan. In addition, he was involved in the performance of an engineering evaluation and cost analysis for the removal action that summarized investigation results and evaluated remedial alternatives in accordance with the National Contingency Plan. Following public comment and EPA review, a preferred remedial alternative was selected. The design team's analysis report presented design criteria and regulatory requirements for the preferred alternative, rationales for design decisions, and a detailed construction cost estimate. Mr. Spadaro served as senior technical review scientist for the project.

Metal Bank Superfund Site Remediation (1998–2001)

PRP Group, Philadelphia, Pennsylvania

River sediments and upland areas were contaminated with polychlorinated biphenyls from the recycling of 1970s-era transformers and transformer oils at this former metals recycling facility located on the banks of the Delaware River; the design team was responsible for remediation of the river sediments. Mr. Spadaro provided senior technical review during development of the preliminary design submittal to EPA Region III.

Design of Hylebos Waterway, Phase I Dredging, Slip 1 Disposal (1999–2002)

Port of Tacoma, Tacoma, Washington

Cleanup of the outer Hylebos Waterway was the third major cleanup in the Commencement Bay Nearshore Tideflats since the bay was declared a Superfund site. Mr. Spadaro served as project

manager for all three design projects. In this cleanup, contaminated sediments at the mouth of the waterway were dredged and deposited in a confined disposal facility constructed in Slip 1 at the Blair Waterway. While serving as project manager, responsibilities included senior technical review and oversight of all project elements, including design of both the dredging plan and the containment facility.

Hylebos Waterway, Area 5106 Dredging and Disposal Project (1999–2002)

Port of Tacoma, Tacoma, Washington

Mr. Spadaro provided the port with technical oversight as it developed plans for the dredging, treatment, and disposal of approximately 50,000 cubic yards of sediments heavily contaminated with volatile organic compounds. Plans called for hydraulic dredging followed by thermal treatment of the sediments at an upland treatment plant and disposal of the treated sediments in a confined disposal facility to be constructed in Slip 1 of the Blair Waterway. Mr. Spadaro was responsible for reviewing all technical documents on behalf of the Port, including studies of fate and transport and the engineering evaluation/cost analysis.

Ross Island CAD Cells Assessment (1998–2000)

Port of Portland, Portland, Oregon

From 1992 to 1998, sediments dredged by the Port of Portland were disposed of under permit at five capped aquatic disposal (CAD) cells in Ross Island Lagoon (Willamette River), where sand and gravel mining was ongoing. In 1999, the port asked the design team to initiate a comprehensive site investigation to evaluate regulatory and environmental issues associated with use of the CAD cells, including such components as contaminant fate and transport, geotechnical stability, and ecological and human health risks. Mr. Spadaro served as program manager and provided senior technical review for the investigation, which incorporated extensive sampling of soil, sediments, and groundwater; a thorough review of the mining and disposal history, including a detailed permit review; biological surveys; risk assessments; and an analysis of lagoon bathymetry and groundwater flow and gradient. Evaluation of the investigation results will be used by the Oregon Department of Environmental Quality to determine whether this type of confined disposal will continue in Oregon. The investigation results demonstrated conclusively that capped aquatic disposal can be accomplished in an environmentally safe manner and that these CAD cells are functioning as intended to isolate Port dredged material from the environment.

Thea Foss and Wheeler-Osgood Waterways Pre-Remedial Design (1994–2003)

City of Tacoma, Tacoma, Washington

Mr. Spadaro served as project manager for the sediment remedial design component of this large-scale waterway redevelopment. The 8,000-ft-long waterway receives considerable storm drainage and direct discharges from adjacent industries. The variety of inputs, including effects from operation of a former manufactured gas plant, had caused several inorganic and organic constituents of interest, such as oils, tars, polycyclic aromatic hydrocarbons, phthalates, and PCBs, to develop in the sediments. Technical elements of the remedial design included an evaluation of source control measures, a natural recovery analysis, an evaluation of potential disposal sites, a hydrographic survey, and the development of habitat mitigation plans. The remedial design included natural recovery in the mouth of

the waterway, enhanced natural recovery in its middle section, and more active remediation at the head of the waterway. Several alternatives were considered for the active remediation, including capping the contaminated sediments in place or removing them to a confined aquatic, nearshore, or upland disposal site. The pre-remedial design process concluded in 2000, and the remediation plan received EPA approval. The remedy incorporated dredging approximately 700,000 cubic yards of sediments and capping 36 acres, including thin-layer and thick-layer caps, and an innovative hybrid sorbent cap that will combine the traditional function of isolation with a treatment component for oily seeps. In addition, Mr. Spadaro managed the design of a confined disposal facility in the adjacent St. Paul Waterway, where the dredged sediments will be placed. He also assisted the city in a related effort to proportionately allocate cleanup costs among numerous non-city potentially responsible parties and to recover the city's costs from its insurers.

Contaminant Mobility Investigation and Dredging Feasibility Study (1998–2000)

Confidential Client, Massachusetts

Mr. Spadaro served as technical specialist for issues of contaminant mobility and remedial alternatives in the evaluation of an historical manufactured gas plant. The site is regulated under the Massachusetts state cleanup program. He assisted the owners and prime consultants in their assessment of oil-releasing sediments; key to investigation was an evaluation of nonaqueous phase transport from upland areas to sediments, from sediments to the water column, and through the water column offsite to nearby estuaries. He accomplished this analysis through evaluation of existing data, proposing additional data gathering to close gaps, and assisting in the development of a focused feasibility study for remedial action at site. Mr. Spadaro evaluated several technologies, including dredging to remove oil-containing sediments, capping, natural recovery, and controlling nonaqueous phases, both to determine the best available technical approach and to control potential costs. Ultimately, he provided the PRP client with the information necessary to negotiate a financial settlement, relieving it of future liability for the site.

Grand Calumet River/Indiana Harbor Ship Canal Remedial Options Assessment (1997–1999)

PRP Group, East Chicago/Gary/Hammond, Indiana

On behalf of the PRPs, Mr. Spadaro assessed remedial options for sediments in this system under a Natural Resource Damage Assessment action brought by the Natural Resource Trustees, which included the EPA, the U.S. Fish and Wildlife Service, and the Indiana Department of Natural Resources. He acted as technical specialist for the evaluation of remedial alternatives, and assisted the project team by identifying gaps in the existing data set; defining the need for further technical studies; interpreting existing chemical and physical testing data; establishing the history of dredging and sediment deposition in the waterways; and providing strategic guidance to the PRP group. On the basis of this evaluation, the PRPs made a settlement offer to the regulatory agencies on the basis of this evaluation.

Island End River MGP Site Evaluation (1998–2001)

Eastern Enterprises, Weston, Massachusetts

Mr. Spadaro was retained by the PRPs to evaluate the feasibility of reconfiguring a CDF proposed to contain sediments contaminated with PAHs at this Boston Harbor site of a former manufactured gas

plant. In addition, he assessed methods for managing sheen-producing sediments that will remain outside the CDF's boundaries. He provided senior technical review for these evaluations, with particular emphasis on oil seepage and innovative approaches to the management of oily sediments.

Brooklyn Navy Yard Confined Disposal Area Feasibility Study (1998–2000)

Brooklyn Navy Yard Development Corporation, Brooklyn, New York

Faced with the necessity of dredging to accommodate ongoing vessel maintenance, Mr. Spadaro evaluated the feasibility of constructing a bermed, nearshore CDF at the head of the Wallabout Channel to contain up to 450,000 cubic yards of dredged material. In addition, the feasibility study examined other disposal alternatives, such as constructing an upland CDF, using the dredged material as landfill cover, or removing the material for offsite disposal under a mine reclamation program. In support of the feasibility study and other efforts, he provided senior technical review, with particular emphasis on the assessment of chemical fate and transport and contaminant mobility. Other elements of the project included development of a conceptual design for the CDF and an evaluation of the regulatory structure and key permitting requirements.

Fox River Dredging (1998–2000)

Fort James Corporation, Green Bay, Wisconsin

As a result of historical discharges to the river system, bottom sediments in the lower Fox River are impacted by PCBs. As one PRP, Fort James Corporation had a keen interest in the selection of appropriate, technically sound, and cost-effective remediation and restoration actions. During early planning for a possible remedial action, Mr. Spadaro assisted Fort James in assessing issues broadly associated with its liability. After a demonstration dredging project undertaken by the state and the Fox River Group, a PRP organization, failed to meet expectations and attain cleanup goals, Fort James elected to independently redesign and complete the project as a full-scale removal. For that more recent work, Mr. Spadaro managed technical oversight of the dredging design. Careful engineering of the dredge prism was a key issue; because capacity at the disposal site was limited, cleanup goals had to be achieved while limiting the removal to 50,000 cubic yards. Following the removal action, verification sampling showed that the design team's engineering had successfully met both objectives, resolving Fort James' obligations at the site.

Claremont Channel Deepening (1997–2002)

Hugo Neu Schnitzer East (HNSE), Jersey City, New Jersey

This project, a public-private partnership among the State of New Jersey, the City of Jersey City, HNSE (a major metal recycling firm), and Liberty National Development Corporation, incorporated several phases, all associated with improvements in the Claremont Channel. Key elements of the proposed effort included dredging 1.25 million cubic yards of contaminated sediments and beneficially using the dredged material to create five acres of intertidal habitat, as well as to cap two former upland industrial properties and grade a new golf course. Dredged material employed at the upland sites and in the golf course were amended with PROPAT®, a product manufactured by HNSE from auto shredder residue, a recycled material. Mr. Spadaro served as technical specialist regarding matters of dredging design, CDF design, bench-scale and pilot-scale mixing studies, permitting, and project funding, which will

include state bond funds and funds designated for demonstrating the efficacy of new remediation technologies.

Nearshore Confined Disposal Facility (1996–1999)

River Terminal Development Corporation, New Jersey

Mr. Spadaro served as technical specialist for permitting and conceptual design of the first nearshore confined disposal facility in the New York/New Jersey area proposed for construction specifically to contain contaminated sediments. In the early project stages, responsibilities included negotiating with the Corps of Engineers and regional regulators (including the New Jersey Department of Environmental Protection) to secure the necessary permits. He also led discussions with local environmental groups to develop support for the remediation of severely contaminated sediments, which would lead to some habitat destruction, as well as to redevelop an important waterfront facility. Participation included assessments of contaminant mobility and habitat mitigation requirements.

Remedial Investigation and Feasibility Study (RI/FS) of Shipyard Sediment Operable Unit (1994–2000)

Lockheed Martin Corporation, Seattle, Washington

Mr. Spadaro served as project manager for work undertaken on behalf of a PRP. He reviewed the EPA's RI/FS study documents, developed supplemental remedial investigation strategies, and negotiated the statement of work and Administrative Order on Consent with the EPA. Technical aspects of the pre-remedial design studies included surface and subsurface sediment sampling, biological evaluations, and natural recovery analysis. Involvement continued through design analysis and development of a preliminary remedy design that included limited dredging and capping. The design team was successful in demonstrating to the EPA that large-scale active remediation was unnecessary, thus reducing the projected costs of remedial action by more than a factor of 10.

Litigation Support for Blair, Sitcum, and Milwaukee Waterways Cost-Recovery Action (1995–1997)

Attorneys for the Port of Tacoma, Tacoma, Washington

Mr. Spadaro supported litigation and cost-recovery actions through investigation of the origins of sediment contamination in the waterways and adjacent upland properties and development of dredging and sediment contamination chronologies. To this end, he implemented a methodology structured to capture all available literature and documentation, including Port contract records, Corps of Engineers files, previous investigations, aerial photographs, and personal interviews. The historical information was then correlated with sediment contamination profiles to provide technical grounds for legal action against insurers and other PRPs. The work culminated with testimony as an expert technical witness.

Sitcum Waterway Remediation (1991–1995)

Port of Tacoma, Tacoma, Washington

Mr. Spadaro served as project manager for this complex, long-term remediation, the largest sediment remediation ever undertaken by EPA mandate. One purpose of the project was to increase container terminal space by filling approximately 70 percent of the Milwaukee Waterway with 1.6 million cubic yards of fill sediments taken from the Blair Waterway (where redevelopment plans called for removing

sediments to expand Port facilities) and the Sitcum Waterway (where sediment removal was a component of the Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA] cleanup). The project began with a conceptual design in the early 1980s and progressed to encompass sediment quality testing, geotechnical engineering, hydrogeologic evaluations, and pre-remedial design and remedial design phases. Conceptualized specialty services executed by the design team included elutriate, leaching, and settling tests; natural recovery modeling; and dredge and disposal water quality modeling. In addition, Mr. Spadaro managed environmental permitting issues and ensured compliance with CERCLA and Clean Water Act mandates.

Mercury Contamination Source Evaluation Middle Waterway (1990–1993)

Foss Maritime, Tacoma, Washington

Mr. Spadaro served as project manager for this investigation of the source of mercury contamination in sediments. He conceptualized and oversaw focused sampling of seeps, upland soils, and sediments to assess ongoing source control measures. This project required a comprehensive review of historical sources of mercury deposits in the waterway, which in turn led to subsequent development of an expanded PRP list. Components of the pre-remedial design included natural recovery modeling and an assessment of the feasibility of various alternatives for confined disposal.

Sediment Assessment of Blair Waterway, Slip 2 Nearshore Fill (1987–1990)

Port of Tacoma, Tacoma, Washington

This logistically complex project called for expanding the land area of Terminal 3 and constructing Terminal 4 at the port by dredging adjacent offshore sediments and using the dredged material to fill Slip 2. As project manager, Mr. Spadaro oversaw the collection of sediment samples using hollow-stem augers, impact coring, and vibracoring through 40–60 ft of water and to 20–40 ft below the mud line. The team was able to significantly reduce the sampling and analysis requirements through negotiation with regulatory agencies. In addition, and of considerable benefit to the client, initial assessment of sediment chemistry was so thorough that when the Port altered its original plan, it was not necessary to negotiate the chemistry requirements.

Open-Water Sediment Disposal Permits for Multiple Waterfront Facilities in Puget Sound

As project manager for Puget Sound Dredge Disposal Analysis (PSDDA) compliance, Mr. Spadaro negotiated with regulatory agencies to develop technically sound and cost-effective sampling plans, oversaw and managed sampling and chemical analyses, and provided senior review of technical studies. This effort successfully obtained PSDDA-related permits:

Open-Water Disposal Permit for Sitcum Waterway Maintenance Dredging (1987–2000)

Port of Tacoma, Tacoma, Washington

Open-Water Disposal Permit for Everett Marina Project (1989)

Port of Everett, Everett, Washington

Open-Water Disposal Permit for Hylebos Facility Project (1990)

Lone Star NW, Washington

Open-Water Disposal Permit for West Blair Terminal Project (1995)

Port of Tacoma, Tacoma, Washington

Open-Water Disposal Permit for SeaLand Pier Extension Project (1989)

Port of Tacoma, Tacoma, Washington

Open-Water Disposal Permit for Pier 7D (1988)

Port of Tacoma, Tacoma, Washington

Open-Water Disposal Permit for Terminal 3 (1987)

Port of Tacoma, Tacoma, Washington

Queen City Farms Superfund Site Waste Pond Closure (1984–1987)

Rabanco Disposal Company, Washington

Mr. Spadaro served as the owner's representative during construction and provided daily field reports and briefings. Activities at this major Superfund site included extensive geologic exploration and mapping in support of remedial design for closure of four industrial waste lagoons. Exploration techniques included hollow-stem auger, air rotary, and impact hammer drilling as well as test pits and trenching. Mapping of subsurface waste deposits and underlying glacially overridden advance, outwash, and till deposits was critical for successful design of waste excavation, groundwater interceptor trench, impermeable cap, and slurry cutoff wall.

**Academic
Qualifications**

MS in Geochemistry, University of Chicago, 1983

BS in Chemistry, Cook College at Rutgers University, 1981

**Professional
Affiliations**

- American Chemical Society
 - Central Dredging Association
 - Western Dredging Association
 - Society of Environmental Toxicology and Chemistry
 - Permanent International Association of Navigational Congresses
 - Society of Industrial Archeology
-

**Publications
and
Presentations**

Spadaro, P. and L. Rosenthal. "Funding the Cleanup of Rivers and Harbors: Cities, Polluters, Ports, Developers, and the Promise of Circular Economy" – Submitted in February 2020 to Journal of Soil and Sediment for publication in special 20th anniversary edition.

Spadaro, P., "From Record of Decision to Basis of Design – Dealing with the Details," Presentation, Environmental Law Education Center Seminar on Sediment Remediation Technologies – What is Effective, Portland, OR, January 29, 2020.

Spadaro, P. and L. Rosenthal. "Waterfront Contribution: A New Finance Paradigm for Cleanup of Contaminated Sediments." Technical paper and presentation – 22nd World Dredging Congress (WODCON), Shanghai, China, April 22–26, 2019.

Spadaro, P., and T. van Hoestenbergh. "Use of a Fiber Optic Temperature Sensor System to Evaluate EMNR/MNR at a Sediment Remediation Site." Presentation, 15th International AquaConSoil Conference, Antwerp, Belgium, May 20–24, 2019.

Spadaro, P. "Who should Pay for Sediment Cleanup?" Presentation, 15th International AquaConSoil Conference, Antwerp, Belgium, May 20–24, 2019.

Glenn J., A. Hackett, and P. Spadaro. "Best Practices and Lessons Learned for an Efficient and Equitable Allocation." Poster, Battelle – Tenth International Conference on Remediation and Management of Contaminated Sediments, New Orleans, LA, February 2019.

Spadaro, P. and J. Winter-Stoltzman. "Use of a Fiber Optic Temperature Sensor System to Evaluate EMNR/MNR at a Sediment Remediation Site." Presentation, Battelle – Tenth International Conference on Remediation and Management of Contaminated Sediments, New Orleans, LA, February 2019.

Dittman, J. and P. Spadaro. "Who Should Pay for Sediment Cleanup?" Paper/presentation, Eighth International Smart Rivers Conference, Pittsburgh, Pennsylvania, September 18–21, 2017.

Spadaro, P., J. Gabster, S. Biondi, F. Sambo, and B. Kellems. "Stormwater Management at Facilities Draining to Sediment Superfund Sites." Paper/presentation, 16th Annual Stormwater Conference (StormCon), Bellevue, Washington, August 27–31, 2017.

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Vanacker, G., P. Spadaro, N. Van den Heuvel, and B. Caussyn. "Remediation of Urban Waterways in Flanders – The Bluegreen Network and Eeklo Example." Paper/presentation, Tenth International SedNet Conference, Genoa, Italy, June 14–17, 2017.

Dittman, J., M. Hayes, D. Profusek, B. Romagnoli, and P. Spadaro. "CERCLA Sediment Remediation – Managing Cost Risk and Uncertainty." Paper/presentation, Ninth International Conference on Remediation and Management of Contaminated Sediments, New Orleans, Louisiana, January 9–12, 2017.

Glenn, J., P. Spadaro, C. Moody, and R. Reed. "Who Owns the Riverbed?" Paper/Presentation, Ninth International Conference on Remediation and Management of Contaminated Sediments, New Orleans, Louisiana, January 9–12, 2017.

Sittoni, L., K. Cronin, B. van Maren, J. Rego, R. Schueder, P. Spadaro, J. Dittman, C. Moody, and D. Profusek. "A Robust and Effective Approach to Evaluate Impact of Stormwater Discharge to Sediment Concentration." Paper/Presentation, Ninth International Conference on Remediation and Management of Contaminated Sediments, New Orleans, Louisiana, January 9–12, 2017.

Spadaro, P., G. Vanacker, G. Kayens, W. De Cooman, J. Teuchies, K. Van Nieuwenhove, K. Lauryssen, and A. Boden. "Sediment Remediation in Flanders – A New Model for Intragovernmental Coordination." Poster/Presentation, Ninth International Conference on Remediation and Management of Contaminated Sediments, New Orleans, Louisiana, January 9–12, 2017.

Spadaro, P. "Case Studies in the Remediation and Restoration of Urban Waterways." Presentation, Winter meeting of IE-NET (Engineering network of Flanders and Brussels), Antwerp, Belgium, December 2016.

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Spadaro, P. "National Trends and Important Considerations in Sediment Cleanup." Keynote Address at the Oregon Environmental Cleanup Conference, Portland, Oregon, September 18, 2015.

Spadaro, P., J. Beaver, and C. Brown. "Commencement Bay Superfund Multiple CDFs: Designs and Long-Term Performance Evaluations." Presentation, Dredging 2015 Conference, Savannah, Georgia, October 19–22, 2015.

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Spadaro, P., S. Bowerman, J. Dittman, D. Profusek, C. Moody, and K. Maitland. "Evaluation of the Effect of Bridge Coatings on Sediment Quality." Poster/Presentation, International Conference on Contaminated Sediments (ContaSed 2015), Ascona, Switzerland, March 8–13, 2015.

Bowerman, S., P. Spadaro, J. Dittman, D. Profusek, C. Moody, and K. Maitland. "Evaluation of the Effect of Bridge Coatings on Sediment Quality." Poster/Presentation, Eighth International Conference on Remediation and Management of Contaminated Sediments, New Orleans, Louisiana, January 12–15, 2015.

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REBUTTAL EXPERT REPORT PREPARED FOR HANSON PERMANENTE CEMENT, INC.

IN RESPONSE TO TIG ENVIRONMENTAL'S EXPERT REPORT



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Westside Property
5900 West Marginal Way Southwest
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Report Date:

June 3, 2020

CONFIDENTIAL MEDIATION COMMUNICATION

Rebuttal Expert Report Prepared for Hanson Permanente Cement, Inc.: In Response to TIG Environmental's Expert Report

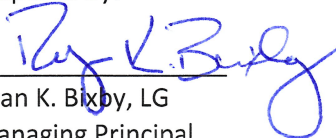
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TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS.....	iii
TABLE OF CONTENTS.....	I
1.0 INTRODUCTION	1
2.0 SUMMARY OF THE TIG ALGORITHM.....	1
3.0 SUMMARY OF REDEVELOPMENT ACTIVITIES.....	2
3.1 CARLISLE	3
3.2 REICHHOLD	4
3.3 HANSON	6
3.4 PORT OF SEATTLE	6
4.0 ADJUSTED ASSIGNMENTS OF LIABILITY USING TIG’S ALGORITHM	7
5.0 EQUITABLE FACTORS IGNORED OR MISAPPLIED BY THE TIG EXPERT REPORT	9
5.1 LIABILITY FOR THE UNKNOWING PLACEMENT OF CONTAMINATED MATERIAL SHOULD PRIMARILY BE ASSIGNED TO THE PARTIES THAT CAUSED THE CONTAMINATION.....	9
5.2 THE DEGREE OF CARE EXERCISED BY PARTIES IS NOT REFLECTED IN THE TIG ALGORITHM	10
5.3 GLACIER’S FAILURE TO PERFORM THE INVESTIGATION AND REMEDIATION OF IMPACTS WITHIN A REASONABLE TIME PERIOD HAS RESULTED IN INCREASED COSTS AND AN EXACERBATION OF CONDITIONS AT THE PROPERTY	11
6.0 SUMMARY AND CONCLUSIONS.....	12

FIGURES

- 1 Property Location Map
- 2 Carlisle Redevelopment Features
- 3 Reichhold Redevelopment Features
- 4 Hanson Redevelopment Features
- 5 Port of Seattle Redevelopment Feature

TABLES

- 1 Carlisle Redevelopment Features
- 2 Reichhold Redevelopment Features
- 3 Hanson Redevelopment Features
- 4- Port of Seattle Redevelopment Features

TABLE OF CONTENTS (CONTINUED)

- 5 Reallocation of Carlisle Exacerbation Shares
- 6 Relative Weights of Site COPCs
- 7 Relative Contributions of Each Property COPC During Each Operational Period
- 8 Percent of the Total Past Cost Attributable to Each Operational Period
- 9 Proportions of Total Cost Attributable to Owners and Operators
- 10 Share of Total Costs Assigned to Each Party
- 11 Summary of Collective Exacerbation Factor at 15%
- 12 Summary of Collective Exacerbation Factor at 10%
- 13 Summary of Collective Exacerbation Factor at 5%

APPENDICES

- A Carlisle Lumber Company Supporting Information
- B Reichhold Chemicals, Inc. Supporting Information
- C Hanson Permanente Cement, Inc. Supporting Information
- D Port of Seattle Supporting Information
- E Glacier Northwest, Inc. Supporting Information
- F Bibliography

ACRONYMS AND ABBREVIATIONS

AO	Agreed Order
ARMY	U.S. Army
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
Carlisle	Carlisle Lumber Company
COPC	contaminant of potential concern
Crown Zellerbach	Crown Zellerbach Corporation
D/Fs	dioxins/furans
Ecology	Washington State Department of Ecology
ERM	ERM-West Inc.
ERM RI	DRAFT Remedial Investigation/Feasibility Study Report—Volume 1, dated January 24, 2020, prepared by ERM-West, Inc.
Glacier	Glacier Northwest, Inc.
Hanson	Hanson Permanente Cement, Inc.
Mineralized Cell	Mineralized Cell Wood Preserving Company
MTCA	Washington State Model Toxics Control Act
PCP	pentachlorophenol
the Property	the uplands portion of the Westside Property located at 5900 West Marginal Way Southwest in Seattle, Washington; King County Parcel Number 192404-9029
PRP	potentially responsible party
Reichhold	Reichhold Chemicals, Inc.
RI/FS	Remedial Investigation/Feasibility Study
T115	Terminal 115
TIG	TIG Environmental
U.S.	United States

Hanson Rebuttal Report to Expert Report

1.0 INTRODUCTION

I am pleased to provide you with this rebuttal report in response to the expert report prepared by Mr. Philip A. Spadaro of TIG Environmental (TIG), which was submitted as part of the ongoing proof of claim by Glacier Northwest, Inc. (Glacier) against Hanson Permanente Cement, Inc. (Hanson; formerly known as Kaiser Cement Corporation). In its expert report (the TIG expert report), TIG assigned liability to the current and former owners and operators of the Westside Property, located at 5900 West Marginal Way Southwest (the Property; Figure 1), for costs related to contamination that is present at upland portions of the Property as the result of the historical operations on and in the vicinity of the Property.

2.0 SUMMARY OF THE TIG ALGORITHM

TIG acknowledged in its expert report that the available information does not allow for a clear determination of liability for the distribution of impacts or for the investigation or remediation costs incurred to date (TIG 2020, 5). As such, TIG created a 7-step algorithm to assign liability. Those steps include the following:

- **Step 1.** Derive the relative weight of Property contaminants of potential concern (COPCs).
- **Step 2.** Derive the relative contributions of each Property COPCs by each operator.
- **Step 3.** Multiply the results of Steps 1 and 2 to derive the percent of the costs attributable to each operational period for each COPC.
- **Step 4.** Assign responsibility to Property owners during operating periods.
- **Step 5.** Assign a liability share to each owner and operator.
- **Step 6.** Account for exacerbation of existing contamination during redevelopment activities and reallocation of costs between the remaining liable parties.
- **Step 7.** Reallocate liability shares between participating parties.

Steps 1 through 5 of the TIG algorithm relied upon empirical metrics such as the number of samples containing elevated concentrations of various COPCs and the years of operation or ownership by the various parties. Although I observed that some of these data used in TIG's algorithm is empirically incorrect (e.g., Hanson's years of operation were reported at 27 rather than 23 [1965–1987] and Reichhold's years of operations were reported as 20 rather than 16 [1946–1961]), most of those data errors do not appear to materially change the outcome of TIG's Steps 1 through 5 (TIG 2020, Table 2). However, other metrics used in Steps 1 through 5 of the TIG algorithm, including the distribution of liability between an owner and operator, the size of each party's operational areas, and the assignment of liability to off-Property parties that may have contributed contamination to the Property, were subjectively determined by TIG.

Based on Steps 1 through 5 of its algorithm, TIG concluded that the largest share of liability should be assigned to Mineralized Cell Wood Preserving Company (Mineralized Cell; 39.48 percent), followed by Reichhold Chemicals, Inc. (Reichhold; 27.49 percent) and the U.S. Army (Army; 15.50 percent). The remaining parties were each assigned liabilities of no more than 6 percent. In the TIG algorithm, Hanson's cement terminal operations at the Property between 1965 and 1987 were assigned a 1.26 percent assignment of liability; a comparable assignment of 1.39 percent was made to Glacier, which is

understandable, given the similar nature and duration of Hanson's and Glacier's operations (TIG 2020, Table 5).

However, in Step 6 of its algorithm, TIG abandoned any semblance of objectivity and assigned Hanson a 15 percent "exacerbation factor," which had the effect of transferring some of the liability shares from parties that owned or operated at the Property prior to 1965 to Hanson. TIG attempted to justify this transfer of liability by claiming that Hanson had "knowingly" exacerbated the investigation and remediation of the Property during the redevelopment of the Property by placing contaminated material at locations where it did not previously exist, including along the shoreline of the Property. The only justification provided by TIG for assigning Hanson a 15 percent exacerbation factor was that 15 percent constituted more than a de minimis amount and was less than the amount that would result in Hanson being assigned a greater share of liability than the parties that originally generated the contamination (TIG 2020, 24). These are purely arbitrary criteria. While I agree with TIG's conclusion that Hanson doesn't warrant an assignment of liability that exceeds the amount assigned to the generators of the contamination, I do not agree that Hanson's alleged actions were a "knowing" exacerbation or that those alleged actions warrant Hanson being assigned more than a very minor share of liability. Nor do I agree that Hanson alone should be assigned an exacerbation "penalty" when the evidence demonstrates that other Property owners engaged in similar movement of materials during their redevelopment activities.

In this rebuttal report, I will address the shortcomings of the TIG algorithm and provide alternative assignments of liability that utilize the shares assigned in Steps 1 through 5 of the TIG algorithm, along with exacerbation factors that are more empirically and equitably assigned to each of the parties that performed redevelopment activities at the Property, but remain consistent with the methodology used in Step 6 of the TIG algorithm.

I do not further redistribute the assignments of liability from those parties not involved in the ongoing bankruptcy proceedings, as TIG did in Step 7 of its algorithm, because I see no technical or equitable reason to reassign shares of other parties to Hanson in the absence of any evidence that those other parties are "orphans" as defined in U.S. Environmental Protection Agency's June 3, 1996, Interim Guidance on Orphan Share Compensation, which states that orphan shares are those shares that are ordinarily reallocated to other viable potentially responsible parties because the identified orphan is "(1) potentially liable; (2) insolvent or defunct; and (3) unaffiliated with any party potentially liable for response costs at the site" (<https://www.epa.gov/sites/production/files/2013-10/documents/orphan-share-rpt.pdf>). I also do not calculate the dollar value of the parties' liability, as it appears to me that many of the costs included in Glacier's proof of claim are not recoverable under the Washington State Model Toxics Control Act (MTCA).

3.0 SUMMARY OF REDEVELOPMENT ACTIVITIES

In addition to its assignment of a purely arbitrary 15 percent exacerbation factor exclusively to Hanson, TIG shows that its algorithm was designed to maximize Hanson's share by completely disregarding the fact that the same redevelopment activities for which it assigned Hanson a 15 percent exacerbation factor were also performed by other parties, including by Carlisle Lumber Company (Carlisle) during the construction of the charcoal and Whetlerite manufacturing plant; by Reichhold during its construction and demolition of numerous structures and other improvements associated with the chemical manufacturing plant; and by the Port of Seattle during the construction of Terminal 115 (T115) on the south-adjointing property in approximately 1970.

Although there is no direct evidence proving the materials that may have been redistributed across the Property during these redevelopment activities were contaminated, or that the parties responsible for the activities were aware of the contamination that may have been present in the materials, there is also no reason to exclude these activities from consideration when determining whether to apply an exacerbation factor to the parties that performed the actions, as TIG has done for all parties but Hanson. TIG described most of these parties' activities in its expert report, but conveniently ignored the potentially exacerbating effect of the actions taken by the other owners and operators of the Property when it reassigned liability shares in Step 6 of its algorithm, choosing instead to focus exclusively on actions performed during Hanson's period of operations.

The following sections describe the redevelopment activities performed at the Property and illustrate how those activities could potentially have exacerbated the impacts at the Property by redistributing contamination from one location to another. In an effort to calculate empirical and more equitable exacerbation factors for those parties, I estimated the square footages of the redevelopment activities performed by parties at the Property, which are provided in Tables 1 through 4 and are also presented on Figures 2 through 5.

3.1 CARLISLE

As noted in the DRAFT Remedial Investigation/Feasibility Study Report—Volume 1, dated January 24, 2020, prepared by ERM-West, Inc. (ERM; ERM RI), Carlisle began construction of a charcoal and Whetlerite manufacturing plant on the Property in 1940 or 1941 and completed construction in 1942 (GLACIER06561, at GLACIER06582). The plant, which was operated by Carlisle, the Army, and Crown Zellerbach Corporation (Crown Zellerbach) between 1942 and 1944, included numerous structures located on the northern portion of the Property, and also extended to the central portion of the Property, as depicted on Figure 2. Figure 3 of TIG's expert report (TIG 2020, Figure 3; Appendix A) shows that much of the plant's operational area, as defined by TIG following its review of historical plans (TIG 2020, 4), overlapped with the operational areas of Mineralized Cell. Redevelopment activities performed by Carlisle within these overlapping areas would have encountered impacts from Mineralized Cell, and those impacts may also have been encountered by Carlisle at locations outside the TIG-defined boundaries of Mineralized Cell's operations.

TIG asserts that Hanson excavated an estimated 2,000 cubic yards of soil during the construction of the cement terminal's silos and that Hanson removed as much as 2 feet of soil during the construction of ancillary support buildings (TIG 2020, 12). However, TIG did not similarly assert that Carlisle excavated any material in the course of its construction activities, nor did TIG account for the disturbance to soil that would have occurred during the construction of a septic tank, the installation of an underground storage tank, or the construction of drainage ditches that were utilized by the plant. The features involved in Carlisle's redevelopment activities, which covered a combined area of 70,381 square feet, are described in Table 1 and are depicted on Figure 2.

It is unknown where the soil and other materials that Carlisle disturbed during construction of the charcoal and Whetlerite plant were placed, but if it is TIG's assumption that the materials excavated during Hanson's period of operations were dispersed throughout the Property, the same assumption may also be made regarding Carlisle's redevelopment activities. If TIG's algorithm is to be relied upon in assigning liability and if that algorithm assigns liability to Hanson based on a subjective construction activity exacerbation factor, the TIG algorithm must be modified to include a construction activity exacerbation factor for Carlisle. That exacerbation factor would transfer a portion of the liability assigned to Mineralized

Cell and King County (as the owner of the Property during Mineralized Cell's operations) in Step 6 of TIG's algorithm to Carlisle. None of the Army's liability would be transferred to Carlisle, as the Army's operations at the Property did not begin until after Carlisle's redevelopment activities were completed.

TIG's assignment of a relatively low share of liability to the group of owners and operators of the Whetlerite plant is largely the result of the fact that TIG inappropriately confined the operational area of the charcoal and Whetlerite manufacturing plant to just 136,562 square feet, which included only that area of the Property in which the plant's structures were located (TIG 2020, Table 2 and Figure 3). The ERM RI, however, specifically discusses that the southern portion of the Property during Whetlerite operations included drainage ditches used by the plant and that the southern portion of the Property was used by the operators of the plant as a "dumping grounds," but despite this, TIG does not include the southern portions of the Property in the plant's operational footprint (GLACIER06561, at GLACIER06582).

By contrast, TIG assigned Mineralized Cell an operational area of 371,252 square feet, nearly three times the operational area of the Whetlerite plant (TIG 2020, Figure 3). This assignment was made by TIG despite the fact that the structures and wood treatment area used by Mineralized Cell were limited to a significantly smaller portion of the Property. It is unclear why TIG, despite the empirical evidence to the contrary, elected to define Mineralized Cell's operational area to include portions of the Property where no structures associated with its operations were located but limited the operational area of the Whetlerite plant to the immediate vicinity of its structures. Although Mineralized Cell appears to have transported treated logs along access roads and undoubtedly contributed significantly to the contamination throughout much of the Property, its storage and application of chemicals appears to have been limited to the southern portion of the Property and Mineralized Cell is not known to have used the northern portion of the Property for the intentional disposal of waste, such as the operators of the Whetlerite plant are indicated to have done on the southern portion of the Property in the ERM RI (GLACIER06561, at GLACIER06649-51). Had the Whetlerite plant's operational footprint been expanded to include the "dumping grounds" on the southern portion of the Property, TIG's 17.17 percent assignment of liability to the group that owned and operated the Whetlerite plant (Army, King County, Carlisle, and U.S. Government; TIG 2020, Table 5) would be increased in nearly direct proportion to its increased area of operations. As the only other party responsible for the release of arsenic, copper, and zinc, Mineralized Cell's 39.48 percent liability share assigned to it in Step 5 of the TIG algorithm would have been decreased by an approximately equivalent amount, i.e., reduced by nearly 12 percent (TIG 2020, Table 10). This demonstrates how TIG incorporated their subjective determination of operational areas to arrive at the inequitable assignments of liability listed in Step 5 of its expert report.

3.2 REICHOLD

Following the termination of the collective operations of the charcoal and Whetlerite plant by Carlisle, the Army, and Crown Zellerbach in 1944, which resulted in widespread contamination of the Property (GLACIER06561, at GLACIER06650-51), Reichhold leased the Property from the U.S Government between 1946 and 1961 for use as a chemical manufacturing plant (GLACIER06561, at GLACIER06583). The plant produced and disposed of vast quantities of chemicals at the Property, including pentachlorophenol (PCP), sodium pentachlorophenate, hydrochloric acid, and formaldehyde; dioxins/furans (D/Fs) were also generated during the PCP manufacturing process (GLACIER06561, at GLACIER06583-84). Reichhold's operations were largely performed within the footprint of the previously existing charcoal and Whetlerite plant, but Reichhold also constructed several new features that extended its operations to the central and southern portions of the Property where Mineralized Cell formerly operated, including PCP production plants and two tank farms (Figure 3), as well as drainage ditches throughout the Property and a washwater

impoundment area on the eastern portion of the Property, adjacent to the shoreline. It is not apparent whether the construction of the buildings required the excavation of soil, but there is no reason to believe that the depths of excavation required for Reichhold's construction activities were any shallower than those attributed by TIG to Hanson for its construction of ancillary support buildings; significant excavation of soil would have been necessary for the drainage ditches and impoundment area that Reichhold installed.

During its period of operations, Reichhold also removed several structures that it had previously installed, including the tank farms and PCP production plant. The removal of these structures would have generated construction debris and may have required the excavation of foundations; the material generated by Reichhold's removal of structures and associated foundations was likely disposed of at unknown locations on the Property by Reichhold, just as TIG assumed was done by Hanson during the removal of the charcoal and Whetlerite plant.

Further, the drainage ditches and washwater impoundment area that Reichhold closed would have required the placement of fill material, some or all of which may have originated from contaminated areas of the Property. Because no information exists regarding the source or chemical composition of the material that Reichhold used as backfill in the ditches or washwater impoundment area, I assume that the backfill material originated from another location on the Property and was contaminated at the time of placement, just as TIG assumed about the material that it alleged to have been placed by Hanson. Therefore, the square footages of drainage ditches and impoundment area that were both constructed and backfilled by Reichhold are accounted for twice on Table 2.

Features used in Reichhold's operations were situated throughout the Property, including the drainage ditch that ran in an east-west direction along the Property's southern boundary (GLACIER15394, at GLACIER15404; see Appendix B). Historical aerial photos taken during Reichhold's tenure also show areas of disturbed soil on the northwestern portion of the Property and stockpiled material along the Property's southeastern shoreline¹ (GNW_00045811, at GNW_00045914; see Appendix B). Despite this, TIG did not include these portions of the Property in its definition of Reichhold's operational areas, which they limited to an area of only 268,431 square feet. TIG does not provide justification for their decision to exclude portions of the Property from Reichhold's area of operations, but doing so resulted in a reduction in Reichhold's assignment of liability.

The combined footprint of the features created or removed during Reichhold's period of operations is approximately 110,399 square feet (Table 2, Figure 3). If TIG's algorithm is to be relied upon in assigning liability and if that algorithm assigns liability to Hanson based on a subjective exacerbation factor, the TIG algorithm must be modified to include an exacerbation factor for Reichhold. That exacerbation factor would transfer a portion of the liability assigned to the pre-1946 owners and operators in Step 6 of TIG's algorithm to Reichhold.

¹ As part of the research conducted to prepare this rebuttal report, it was determined from further review of aerial images that the shoreline expansion of the southeastern portion of the Property occurred prior to Hanson's tenure, but did not necessarily occur between 1961 and 1963, as had been reported in Section 4.1 of my expert report. This error does not affect my conclusions presented in this rebuttal report.

3.3 HANSON

Hanson leased the Property from the Port of Seattle in 1965, several years after Reichhold vacated the Property (KC2005739; see Appendix C). As a requirement of its lease, Hanson removed the structures that remained from Reichhold's period of operations and constructed most components of the existing cement terminal, which was completed by 1969. Hanson purchased the Property from the Port of Seattle in 1973 and operated the cement terminal until selling the Property to Lone Star Industries in 1987 (GLACIER06561, at GLACIER06579-80). Hanson's operation of the cement terminal is not considered to be a significant source of impacts to the Property, as demonstrated by the fact that TIG only assigned Hanson a liability share of 1.26 percent in Step 5 of its algorithm. Not surprisingly, TIG included the entire 598,556 square feet of the uplands portion of the Property in its calculation of Hanson's liability, which would maximize the allocation to Hanson, despite the fact that the footprint of Hanson's cement terminal operations was limited to the northern portion of the Property.

In its report, TIG discussed at length the redevelopment activities performed during Hanson's period of operations, speculating and asserting assumptions about the anticipated depth and volume of excavations performed in the course the demolition and construction of various buildings and other features. The areas that may have been disturbed during these activities, which are estimated to cover a total of 98,292 square feet, include the removal of several structures that remained from Reichhold's former chemical manufacturing plant, construction of the cement silos and other cement terminal buildings, excavation of the stormwater swale on the northern portion of the Property, and the construction of a stormwater system on the southern portion of the Property. Notably, much of the redevelopment conducted during Hanson's period of operations occurred in the northern portion of the Property, in areas where the soil had already been disturbed and excavated in the course of the prior redevelopment activities by Carlisle and Reichhold. It is not possible to determine the amount of excavation or relocation of soil that occurred prior to 1965, but the footprints of all of the pre-1965 buildings that were removed during redevelopment of the Property during Hanson's tenure are assumed to have undergone some level of excavation during construction by Carlisle or Reichhold. A summary of the redevelopment activities performed during Hanson's period of tenure and the associated square footages of the features involved in the redevelopment activities is provided in Table 3 and depicted on Figure 4.

According to the ERM RI, Hanson expanded the shoreline of the Property by placing "bank fill" at locations "east of the wooden bulkhead/original shoreline." ERM defined this "bank fill" as having "originated from construction activities related to property redevelopment" during Hanson's period of operations (GLACIER06561, at GLACIER06591). Materials other than those generated during Hanson's redevelopment activities were not identified as having been included in the "bank fill." Because the exacerbation factor that TIG assigned to Hanson was intended to account for the redistribution of contaminated material from one location of the Property to another, I assume that the square footage of the shoreline expansion area has already been accounted for in the estimates of the other features that were demolished or constructed during Hanson's period of operations and therefore should not be counted again in the calculation of an appropriate exacerbation factor for Hanson. The exacerbation factor assigned to Hanson would transfer a portion of the liability assigned to the pre-1965 owners and operators in Step 6 of TIG's algorithm to Hanson.

3.4 PORT OF SEATTLE

The south-adjointing property is occupied by the Port of Seattle's T115, most of which was created in the late 1960s and early 1970s by the placement of fill material. By 1970, T115 had been extended as much as 55 feet onto the easternmost portion of the Property, forming the southern shoreline of Glacier Bay

(GNW_00045881, at GNW_00045937; Appendix D). As depicted in Table 4 and on Figure 5, approximately 21,321 square feet of the T115 expansion area is situated within the boundaries of the Property. According to the expert report prepared by Geosyntec on behalf of Glacier (Geosyntec 2017, 42-43), the chemical compositions of soil samples collected from the eastern shoreline of the Property are similar to those of a sample collected from boring TB-07, which was advanced on the portion of the Property that was created during the expansion of T115. Based on these similarities, Glacier's expert concluded that "the material placed in these areas by [Hanson] and the Port [of Seattle] is attributable to the same source." If this assertion by Glacier's expert report is accurate, then the Port of Seattle would have taken contaminated material from one area of the Property and redistributed it to another area on the Property, which is the basis upon which TIG's assignment of an exacerbation factor to Hanson was made.

There is no evidence that Hanson was involved in the transporting or placing of fill material as part of the T115 expansion activities. Therefore, if TIG's algorithm is to be relied upon in assigning liability and if that algorithm assigns liability to Hanson based on a subjective exacerbation factor, the TIG algorithm must be modified to include an exacerbation factor for the Port of Seattle. That exacerbation factor would transfer a portion of the liability assigned to the pre-1970 owners and operators in Step 6 of TIG's algorithm to the Port of Seattle.

4.0 ADJUSTED ASSIGNMENTS OF LIABILITY USING TIG'S ALGORITHM

TIG correctly concluded that the available information does not allow for a determination to be made regarding the extent to which the redevelopment activities performed at the Property exacerbated conditions or contributed to past investigation and remediation costs based on the distribution of impacts or through a review of past costs. In the absence of empirical data that would allow for such a determination, TIG arbitrarily assigned a 15 percent exacerbation factor to Hanson for the redevelopment activities performed during Hanson's period of operations. This resulted in a transfer of liability from the pre-1965 operators to Hanson in the TIG algorithm. In my opinion, this estimate significantly overstates the exacerbating effect that the redevelopment activities performed during Hanson's period of operations had on the distribution of impacts, and likely exceeds the collective exacerbating effect of all parties that performed redevelopment activities.

The operational histories described above demonstrate that several of the parties that operated on the Property removed and constructed buildings and other features in areas of the Property where contamination was likely present from previous releases. However, TIG's expert report ignored the exacerbating effect that the redevelopment activities of Carlisle, Reichhold, and the Port of Seattle may have had on the distribution of impacts, choosing only to focus on the effect of the redevelopment activities performed during Hanson's tenure. No explanation for this decision was provided by TIG in its expert report. Clearly, if an exacerbation factor is to be assigned to one party for its redevelopment activities, commensurate exacerbation factors should be assigned to all parties that engaged in similar redevelopment activities, not solely to the party against which a proof of claim is being made.

Based on the distribution of impacts at the Property and the general correlation between the distribution of COPCs and the operational areas of those parties that released them, I conclude that if any exacerbation factor is to be used, then an exacerbation factor of less than 10 percent more accurately represents the impact that the collective redevelopment activities had on the distribution of impacts at the Property.

Regardless of the extent to which contamination has been exacerbated by the redevelopment of the Property, it is inequitable for TIG to assign an exacerbation factor to only Hanson when it is apparent that

other parties performed similar redevelopment activities in contaminated areas of the Property. It is also unreasonable for TIG to have excluded portions of the Property from the square footages of pre-1965 operators, as it is clear that each party utilized most, if not all, of the Property (minus the 15,743 square feet of land that was created during the 1967–1968 shoreline expansion). In addition, I observed that TIG incorrectly listed the operational duration of Reichhold and Hanson in their algorithm. To resolve the inequities in liability assignment that are included in the TIG algorithm, I recreated the algorithm and performed the following adjustments:

- The operational square footages for Mineralized Cell, the Army, and Reichhold listed in Table 2 of the TIG expert report were each adjusted to 582,813 square feet (Table 2), which more accurately represents their operational footprints based on my review of historical aerial photographs and documents.
- The time-weighted area scoring in Table 2, of the TIG expert report inaccurately listed the operational durations of Reichhold and Hanson as 20 years and 27 years, respectively. I adjusted these figures to 16 years and 23 years, respectively.
- To correct the exclusion of several redevelopment activities in Step 6 of the TIG algorithm, I conducted a review of historical aerial photographs and documents to develop an estimated total square footage that was included in the demolition and/or construction activities carried out at the Property by Carlisle, Reichhold, Hanson, and the Port of Seattle. These calculated areas are presented in Tables 1 through 4 and depicted in Figures 2 through 5, respectively. Based on the total area of redevelopment activities performed at the Property, each party's relative percentage of redevelopment area at the Property was calculated. These percentages were then multiplied by several subjectively determined collective exacerbation factors (15 percent, 10 percent, and 5 percent) to determine each party's individual exacerbation factor under the three scenarios (Table 5).

These adjustments were then applied to the recreated TIG model (Tables 6 through 10) in the following steps:

- **Step 1.** The adjusted operational square footages and operational durations were applied when calculating new time-weighted area scores for parties in Table 7, which is analogous to Table 2 of the TIG algorithm.
- **Step 2.** The proportion of COPC shares calculated in Table 7 utilizing the new time-weighted area scores were then carried forward in subsequent calculations made in Tables 8 through 10 using the original methodology described in the TIG algorithm. The end result of this process was the generation of adjusted liability shares for each of the parties in Table 10, which is analogous to Table 5 of the TIG Report.
- **Step 3.** In this step the parties' individual exacerbation factors calculated in Table 5 were applied sequentially based upon chronologic order of operations starting with Carlisle, and followed by Reichhold, Hanson, and the Port of Seattle. This step utilizes the same methodology employed in Step 6 of TIG's algorithm used to transfer assignments of liability from prior operators and owners to the exacerbating party, to arrive at the adjusted assignments of liability for each party. The notable exception between TIG's methodology and mine is that I effectively repeated Step 6 of TIG's algorithm four times in a row instead of once to arrive at a final adjustment of liability for each party.

This process was carried out for three different scenarios representing assumed 15 percent, 10 percent, and 5 percent collective exacerbation share redistributions (Tables 11 through 13, respectively.) The table below reflects the final adjusted distribution of liability shares for each of the parties assigned liability in TIG's expert report, which were calculated using the methodology described above.

Party	Liability Share from Step 5 of TIG Algorithm	Adjusted Liability Share from Step 5 of TIG Algorithm	Adjusted Share Using 15% Collective Exacerbation Factor	Adjusted Share Using 10% Collective Exacerbation Factor	Adjusted Share Using 5% Collective Exacerbation Factor
Mineralized Cell Wood Treatment Company	39.48%	27.08%	23.23%	24.74%	25.75%
King County	4.72%	4.12%	3.53%	3.72%	3.92%
U.S. Army	15.50%	28.21%	25.07%	26.10%	27.14%
Carlisle Lumber Company	0.13%	0.23%	1.18%	0.89%	0.58%
Reichhold Chemicals, Inc.	27.49%	27.70%	29.15%	28.71%	28.22%
U.S. Government	3.52%	4.18%	3.93%	4.01%	4.10%
Hanson Permanente Cement, Inc.	1.26%	0.99%	5.42%	3.96%	2.48%
Port of Seattle Terminal T115	0.44%	0.29%	1.27%	0.94%	0.61%
Glacier Northwest, Inc.	1.39%	1.29%	1.29%	1.29%	1.29%
Duwamish Shipyard, Inc.	5.88%	5.74%	5.74%	5.74%	5.74%
Ash Grove Cement, Inc.	0.17%	0.16%	0.16%	0.16%	0.16%
Lone Star Industries/Lone Star Northwest	0.02%	0.02%	0.02%	0.02%	0.02%
TOTAL	100.00%	100.00%	100.00%	100.00%	100.00%

Although the application of a 2.48 percent adjusted individual share of liability assigned to Hanson most closely replicates the 1.5 percent liability share that I assigned to Hanson in my expert report, the individual liability shares calculated in each of the three (15 percent, 10 percent and 5 percent) collective exacerbation columns fail to accurately represent what I consider to be an equitable distribution of liability because TIG's algorithm omits any consideration of certain key allocation factors.

5.0 EQUITABLE FACTORS IGNORED OR MISAPPLIED BY THE TIG EXPERT REPORT

The following sections clarify why I consider the individual adjusted assignments of liability that result from the use of TIG's algorithm to be inequitable.

5.1 LIABILITY FOR THE UNKNOWNING PLACEMENT OF CONTAMINATED MATERIAL SHOULD PRIMARILY BE ASSIGNED TO THE PARTIES THAT CAUSED THE CONTAMINATION

The fact that the overwhelming majority of contamination encountered at the Property was already in place prior to the redevelopment activities performed during Hanson's period of operations is undisputed; each of the pre-1965 operators at the Property actively and intentionally discharged hazardous substances to the Property (GLACIER06561, at GLACIER06648-52). Although TIG asserted that Hanson "knowingly" dispersed contaminated materials throughout the Property (GLACIER06561, at

GLACIER06584-85; GLACIER06653-54; TIG 2020, 11-12), TIG has not produced any evidence of Hanson's awareness of the contamination present at the Property and Hanson has denied any such awareness. Considering that the first environmental investigation that confirmed the presence of contamination at the Property was conducted in 1985, approximately 12 years after Hanson purchased the Property and nearly 20 years after it is accused of placing contaminated material along the shoreline (KC2005992, at KC2006012-15), Hanson's claims that it was unaware of contamination at the Property during its redevelopment activities are credible.

Acknowledging the fact that (1) Hanson did not generate any of the contamination that may have been exacerbated by the redevelopment activities performed during its period of operations, and (2) there is no evidence to suggest that Hanson was aware of the presence of contamination in the materials that were redistributed, it is unreasonable to assign all of the liability for the redistribution of those impacts to Hanson; most, if not all, of the liability for the unknowing placement of contaminated material should instead remain with the parties that generated the contamination. This position is supported by previous allocation decisions by courts, including *Ashley II of Charleston, LLC v. PCS Nitrogen, Inc.*, 791 F. Supp.2d 431 (D.S.C. 2011), *aff'd* 714 F.3d 161 (4th Cir. 2013). In the *Ashley II* case, two interim owner/operators were each alleged to have redistributed existing contamination during site development activities. The owner/operators were unaware of the presence of the contamination, and the court subsequently ruled that the liability shares of the two parties were 1 and 3 percent.

Analogous to TIG's opinion that roughly 90 percent of liability for contamination should be assigned to an operator, leaving approximately 10 percent of the liability with the owner of a property (TIG 2020, 23 and Table 4), it is my opinion that only 25 percent of the liability should be assigned to parties such as Hanson that may have unknowingly redistributed contamination generated by others. The remaining 75 percent of the liability should be assigned to the parties that caused the contamination to be present in the redistributed material.

5.2 THE DEGREE OF CARE EXERCISED BY PARTIES IS NOT REFLECTED IN THE TIG ALGORITHM

The degree of care exercised by a party to prevent the release or further spread of a release during its operations or period of ownership is an equitable factor frequently considered in the allocation process, but the TIG algorithm does not account for this factor in its calculations of liability. This is best illustrated by the assignment of liability to Reichhold, which does not exceed 30 percent in any of the three options presented above. During Reichhold's operation of the chemical manufacturing plant on the Property, numerous unpermitted discharges of toxic chemicals occurred, resulting in fish kills and investigations of Reichhold's operations by regulatory agencies. (GLACIER24884; GLACIER05927; GLACIER24889, at GLACIER24889-90; GLACIER24886, at GLACIER24886-87; Appendix B) As a manufacturer of toxic chemicals, Reichhold was undoubtedly aware of the adverse impacts that these releases could have on human health and the environment, yet it elected to continue to discharge these chemicals to the Property, even constructing an unlined washwater impoundment area along the shoreline of the Property that was intended to allow discharged water containing elevated concentrations of PCP, D/Fs, and other COPCs to infiltrate through the underlying soil and impact groundwater. The egregious nature of Reichhold's operational practices warrants them an assignment of liability that is significantly larger than 30 percent. In my opinion, Reichhold's liability share should be 50 percent.

The group of owners and operators of the charcoal and Whetlerite manufacturing plant (which I characterized as Carlisle, Crown Zellerbach, and the U.S. Government, and which TIG characterized as the U.S. Army, King County, Carlisle, and the U.S. Government) also demonstrated total disregard for the

impact of their operations on the environment. The toxic wastes generated at the plant were intentionally disposed of in “dumping grounds” on the southern portion of the Property, despite the fact that the Whetlerite being manufactured and tested at the plant was intended for use in gas masks to prevent human exposure to the types of toxic chemicals that were being dumped on the Property. My collective assignment of 28 percent liability to this group reflects the poor degree of care they exercised in the disposal of wastes; the much lower collective assignment of just 17.17 percent of pre-exacerbation liability to this group in Table 5 of TIG’s expert report does not, and in this regard misses the mark.

5.3 GLACIER’S FAILURE TO PERFORM THE INVESTIGATION AND REMEDIATION OF IMPACTS WITHIN A REASONABLE TIME PERIOD HAS RESULTED IN INCREASED COSTS AND AN EXACERBATION OF CONDITIONS AT THE PROPERTY

Glacier, Reichhold, and the Washington State Department of Ecology (Ecology) entered into an Agreed Order (AO) to complete the investigation and remediation of the Property in 2009 (GLACIER21570). In an August 10, 2011, letter to ERM as Glacier’s consultant, Ecology expressed disappointment regarding Glacier’s failure to incorporate many of the edits that Ecology had required Glacier to make to the previously submitted Draft Remedial Investigation and Feasibility Study Work Plan (RI/FS Work Plan; GLACIER03706, at GLACIER03706-08; Appendix E). In another letter from Ecology to Glacier’s consultant, dated August 31, 2012, following Glacier’s submittal of a third draft version of the RI/FS Work Plan, Ecology stated that it “...has determined that Glacier Northwest, Inc. and Reichhold, Inc. ... have made insufficient progress to date toward completion of Task 1 – Preparation of the RI/FS Work Plan.” The August 2012 letter states that Ecology had notified Glacier in a letter dated April 11, 2012, that “continued unresponsiveness to Ecology’s concerns might result in Ecology completing and finalizing the Plan” and that Glacier had been advised in a letter dated June 29, 2012, that insufficient progress had been made on completing “an approvable draft Plan.” (GLACIER05105, at GLACIER05105-6; Appendix E) As a result of these repeated warnings from Ecology coupled with the insufficient progress made by Glacier toward the completion of a plan that sufficiently addressed Ecology’s concerns, Ecology advised Glacier in the August 2012 letter that it had assumed responsibility for the completion of the Final RI/FS Work Plan, which Ecology indicated it was requiring Glacier to complete in accordance with the schedule outlined in the AO. Despite the nearly 8 years that have passed since Ecology required Glacier to implement the scope of work outlined in the work plan, and the nearly 30 years that have passed since Glacier purchased the Property, Glacier has still not finalized the remedial investigation or feasibility study of the Property, much less developed or implemented a final cleanup action plan.

Based on my 22 years of environmental consulting practice in Washington State, I can verify that it is extremely unusual and rare occurrence for Ecology to decree that it will take over the completion of work that a potentially responsible party (PRP) agreed to perform. Such a decree by Ecology would only be issued after a PRP grossly and repeatedly failed to comply with the minimum requirements established for an environmental response under applicable law. Glacier’s failure to adhere to the scheduling requirements of the AO and the highly unusual step taken by Ecology to assume responsibility for the completion of the Final RI/FS Work Plan due to Glacier’s lack of sufficient progress leads me to conclude that some of the actions performed at the Property are not consistent with the purposes of MTCA to identify, eliminate, or minimize any threat or potential threat posed by hazardous substances to human health or the environment and are therefore not remedial actions for which costs are recoverable under MTCA. Likewise, some of the actions performed at the Property by Glacier and Reichhold are not consistent with the National Contingency Plan and are therefore not recoverable response costs under CERCLA. Some of the invoices provided by Glacier clearly relate to other environmental matters, including the investigation of sediments, which are not appropriate for inclusion in Glacier’s proof of claim; some

of the invoices incorporate block billing so that no one could determine whether the work being billed related to the Property or some other project (e.g., the \$542,680.93 of CH2MHill block billing); and some of the invoices relate to Glacier's lack of compliance with the AO, Ecology's requests, or MTCA.

Finally, during the nearly 30 years since Glacier purchased the Property, the contamination has continued to migrate, resulting in an expansion of the impacts and further increases to the cost of investigation and remediation. As such, Glacier's assignment of liability should be increased relative to that assigned to its operations in the TIG algorithm. In my opinion, an assignment of 3 percent to Glacier for its failure to act in a responsible and timely manner is warranted.

6.0 SUMMARY AND CONCLUSIONS

In its effort to assign liability for past investigative and remedial costs, TIG utilized an algorithm with metrics that included analytical results of COPCs, operational sizes, and years of operation associated with each of the current and former owners and operators of the Property since 1936, when industrial operations at the Property began. This approach is commonly used in allocation proceedings when, as is the case here, assignments of liabilities cannot reasonably be made based on the distinguishability of the various PRPs' past costs or COPCs. However, in this instance, an objective use of this algorithm appears to have not achieved the desired outcome, so TIG selectively applied a subjective 15 percent exacerbation factor to just one of the former owner/operators (Hanson) for allegedly redistributing contamination at the Property during redevelopment of the Property, which resulted in the transfer of liability to Hanson from the prior industrial operators that generated the vast majority of contamination at the Property. After transferring additional liability from several of the past owners and operators that TIG inappropriately identified as "orphans," the end result of TIG's algorithm was an assignment of 37.54 percent liability to Hanson, representing an increase of 36.28 percent relative to the 1.26 percent assignment that TIG had previously assigned Hanson based solely on its former operations.

In applying an exacerbation factor exclusively to Hanson, TIG ignored the fact that at least three other past operators of the Property engaged in similar redevelopment activities. The redevelopment activities of other operators, which included the construction and demolition of buildings, the excavation and backfilling of drainage ditches and other surface water features, and the placement of fill material along the shoreline of the Property, were conducted in areas of the Property where contamination is known or suspected to have been present, and presented the same risk of contaminant redistribution as the actions taken by Hanson. TIG did not provide an explanation for its selective application of an exacerbation factor to Hanson or a defensible basis for how it calculated the exacerbation factor in the first place.

Redevelopment activities included the placement of material along the shoreline between 1967 and 1968. The source of the material and its chemical composition at the time of placement are not documented and I am not convinced that Hanson, which contracted with other firms to perform the demolition of at least some of the demolition activities, was aware that contaminated material was present in the material being placed along the shoreline. Unlike the pre-1965 operators of the Property, each of which handled and knowingly disposed of toxic chemicals at the Property in the course of normal operations, Hanson is unlikely to have employed scientists or others familiar with the COPCs present in the subsurface.

Other than Hanson's possible contribution to the relatively small amount of petroleum and polycyclic aromatic hydrocarbon impacts present at the Property, which could potentially be attributable to its operations on the Property and for which TIG assigned Hanson a 1.26 percent share of liability, I consider Hanson to have been an unwitting potential participant in the redistribution of contamination at the

Property. It is my opinion that Hanson does not warrant more than a 25 percent assignment of liability for any impacts that can reasonably be shown to have resulted from Hanson's redistribution; the remaining 75 percent of liability for impacts that were generated by others should be assigned to the party or parties that generated the contamination. Hanson does not warrant any liability assignment for impacts that cannot be attributed to its operations or for impacts that cannot be reasonably shown to have been redistributed by Hanson.

It is also my opinion that there is a strong correlation between the distribution of COPCs and the pre-1965 operational and disposal areas where those COPCs were released or migrated via groundwater flow, vehicle traffic. Therefore, with the possible exception of the impacts present in unsaturated soil located within the 1967–1968 shoreline expansion area and saturated soil within this same area that contains elevated concentrations of hydrophobic compounds such as PCBs, PCP, and D/Fs, which I concluded in my expert report constituted merely 2.8 percent of the total distribution of impacts at the Property, the impacts at the Property are not reasonably attributable to Hanson's redevelopment activities.

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FIGURES

TABLES

APPENDIX A
CARLISLE LUMBER COMPANY SUPPORTING INFORMATION

APPENDIX B
REICHHOLD CHEMICAL, INC. SUPPORTING INFORMATION

APPENDIX C
HANSON PERMANENTE CEMENT, INC. SUPPORTING INFORMATION

APPENDIX D
PORT OF SEATTLE SUPPORTING INFORMATION

APPENDIX E
GLACIER NORTHWEST, INC. SUPPORTING INFORMATION

APPENDIX F BIBLIOGRAPHY